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Construction Methods and Equipment

McGraw-Hill Publishing Company, Inc.

May, 1937

Price 20 Cents

LARGEST OF SLUM CLEARANCE projects of PWA's Housing Division is $12,634,000 Ten Eyck Houses on 24 acres in Brooklyn, N. Y., to accommodate 1,625 families. Superstructures built by Starrett Bros. & Eken Inc.

Working closely with contractors throughout the country, Inland engineers have established a well-earned reputation for design and construction ideas that save time and money.

A recent example was the Mississippi River Improvement Lock No. 14 at LeClaire, Iowa, built by the Central Engineering Co., for the U. S. Army Engineers.

There was opportunity to save several thousand dollars on this piling job. Inland engineers began working with the contractors early in the planning stages with this idea in mind.

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It will pay you to make use of this Inland experience on your next piling or other construction job. Inland engineers will justify the confidence you place in them.

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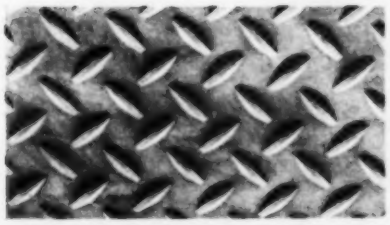

Many Uses for Inland 4-Way Traffic Plate

Its 4-Way safety, 4-Way stiffness, 4-Way cleaning and quick drainage and 4-Way Matching, suggest many varied uses for Inland 4-Way Traffic Plate. Resurfacing bridge floors, building stairs, walkways, platforms and covering openings in floors and sidewalks, are a few of them. A folder containing complete information will be sent on request.

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CURRENT JOBS

. . . . and Who's Doing Them

Buildings

Public — Under a $2,100,000 contract, **Millimet Construction Co.**, of Union City, N. J., is adding stories and pent house to Federal Office Building, New York City. In Troy, N. Y., **P. Rossi**, of Albany, has a $1,429,000 contract for foundation for school. Contract for superstructure of Andrew Jackson Courts housing project in Nashville, Tenn., went to **Central Contracting Co.**, of Dallas, Tex., for $1,277,877. For a two-story depot supply building and warehouse for the Army Air Corps in Sacramento, Calif., the bid of $920,099 by **Eaton & Smith**, of San Francisco, was low. A high school building in the Bronx, N. Y. City, was bid in by **Psaty & Fuhrman, Inc.**, for $862,000. In Kecoughtan, Va., the **Virginia Engineering Co., Inc.**, of Newport News, Va., is building a $694,000 Veterans' hospital. A $616,000 school is under construction at Appleton, Wis., by **M. Schumacher**, of Minneapolis. At the University of North Carolina, Chapel Hill, N. C., **J. A. Jones Construction Co.**, of Charlotte, N. C., is building a $415,957 gymnasium. An armory contract at West Point, N.Y., was bid in for a $498,600, by **E. J. Rappoli**, of Cambridge, Mass. For a high school at Wellesley, Mass., a successful bid of $612,000 was submitted by **M. Spinelli & Sons**, of Boston.

Commercial — A $1,000,000, 12-story apartment at 8 East 70th St., N. Y., is being built by **Wheeler Engineering Co.**, of New York. At East Orange, N. J., a bid of $500,000 obtained an apartment building contract for **Gotham Construction Co.**, of New York City. For a group of residences on a 70-acre tract at Huntleigh Village, Mo., the **Fairfax Construction Co.**, of St. Louis, submitted a bid of $1,000,000. In Albany, N. Y., **D. Polhemus**, of Albany, is constructing 200 residences to cost $800,000. A group of 75 residences in Hammond, Ind., is under construction for $500,000 by **F. J. Walsh Co.**, of Chicago. **M. A. Long Construction Co.**, of Allentown, Pa., is building in that city a $500,000 store building.

Industrial — For a $5,000,000 Chevrolet factory at Tonowanda, N. Y., structural steel contract was obtained by **Bethlehem Steel Co.**, Bethlehem, Pa. A rolling mill at Bridgeport, Conn., for Bridgeport Brass Co., is being built by **Stone & Webster Engineering Corp.**, New York City, at a cost of $4,000,000. In St. Louis, Mo., Crown Can Co. has engaged **Consolidated Engineering Co.**, of Baltimore, to build a $3,500,000 factory. Pennsylvania Electric Co., at Seward, Pa., engaged **Berkebile Bros.**, of Johnstown, Pa., to construct a new light plant forming part of improvements to cost $2,500,000. Ford Motor Co. has given contract for a $1,200,000 tire manufacturing building at River Rouge, Mich., to **Whitehead & Kales Co.**, of Detroit. For the Coca Cola Co., at Dallas, Tex., **Stuart Construction Co.**, of New York, is building an $800,000 plant. A lighting plant at Toledo, Ohio, for the Toledo Edison Co., went to **Bentley Co.**, of Toledo, for $700,000. A bid of $650,000 obtained a garage and warehouse contract at Cincinnati, Ohio, for **F. Messer & Sons**, of Cincinnati. In St. Louis, Mo., **Lundoff-Bicknell Co.**, of Cleveland, Ohio, is building a $500,000 packing plant. A $500,000 truck depot in Chicago is under construction by **F. C. Klemp**, of Chicago. **J. W. Cowper Co.**, of Buffalo, N. Y., is at work on a $600,000 factory in that city. A $500,000 warehouse at Marcus Hook, Pa., is being built by **Turner Construction Co.** of New York, for Congoleum-Nairn, Inc., Cambridge, Mass. **M. Spinelli & Sons**, of Boston are building a $500,000 fertilizer plant for Eastern States Farmers Exchange. **R. L. Spitzley Co.**, of Detroit, is building a $400,000 brewery in that city.

Waterworks

Initial contracts for shafts for New York City's 85-mi. aqueduct tunnel from the Delaware River watershed were let to **Frazier-Davis Construction Co.**, of St. Louis, Mo., for $2,294,415; to **W. E. Callahan Construction Co.**, of Dallas, Tex., for $1,926,150; and to **Dravo Contracting Co.**, of Pittsburgh, Pa. (2 contracts) for $1,738,250 and $4,108,583. In Toronto, Canada, **Atlas Construction Co.**, of Montreal, is installing a 48-in. steel water main for $1,426,000. Colorado River aqueduct contracts in California included Gene Wash dam and Copper Basin dam awarded to **J. F. Shea Co.**, of Los Angeles, for $594,207. At Denver, Colo., **Lock Joint Pipe Co.**, of Denver, obtained two pipe line contracts for $268,217 and $228,689 respectively. Contract for pipe line in Mamaroneck, N. Y., went to **Intercounty Construction Co.**, of Rye, N. Y., for $208,390.

Sewers

Detroit, Mich., awarded a $1,610,214 contract for sewer tunnel to **S. A. Healy Co.**, of Chicago; the same company also obtained a $1,480,199 contract for sewage pumping station and grit chambers in Detroit. Successful bidder on a filtration building and pumping station contract at Lawrence, Mass., was **James A. Munroe & Sons**, of North Attleboro, Mass. At Buffalo, N. Y., sewage disposal contract was awarded to **F. H. McGraw Co., Inc.**, of New York City, for $324,000.

Bridges

In Kansas, **Missouri Valley Bridge & Iron Co.**, obtained two state highway bridges for $805,014 and $50,328 respectively. In San Francisco a superstructure for railway yard in connection with Bay Bridge was bid in for $536,960 by **J. H. Pomeroy & Co.**, of San Francisco. For Deer Isle-Sedgwick bridge in Maine, substructure contract for $488,000 went to **Coleman Bros. Corp.**, of Boston. Low bidder for grade-crossing structure at Elizabethport, N. J., was **Wilson & English Construction Co.**, of New York, with a price of $234,473.

Roads

Highway contracts included the following: New York, $1,292,600 to **P. T. Cox Contracting Co.**, of N. Y., for West Side highway. New York, $1,014,386 to **Poirier & McLane Corp.**, of New York City, for foundations for elevated highway. Pennsylvania, $411,112 to **Dalton Bros.**, of Paoli, Pa., for dual-type paving in Bucks County. California, $366,191 to **R. A. Bell**, of Portland, Ore., for grading in Fresno County. Louisiana, $294,647 and $300,664 respectively to **Barber Bros. Contracting Co., Inc.**, of Baton Rouge, for concrete paving. Arizona, $161,778 to **Turner Construction Co.**, of Phoenix, for road north of Tucson. Iowa, $190,128 to **Dobson & Robinson**, of Lincoln, Neb., for concrete road in Sac County. Michigan, $180,606 to **Bacco Construction Co.**, of Iron Mountain, Mich., for concrete paving in Iron County. Indiana, $291,608 to **McCarthy Improvement Co.**, of Davenport, Ia., for paving in Crawford County; $198,919 to **Calumet Paving Co.**, of Indianapolis, for stone surfacing in Dearborn County; $199,957 to **T. McQueen**, of Forest Park, Ind., for paving in Lake County. New Mexico, $176,959 to **Skousen Bros.**, Albuquerque, for grading and paving in Torrance County. Ohio, $259,684 to **A. J. Baltes**, of Norwalk, Ohio, for grading, drainage and concrete bridge and brick paving in Huron County; $252,124 to **G. L. LaBoiteaux**, of Toledo, for grade crossing structure and asphaltic concrete paving in Lucas County. Texas, $237,236 to **Capital Construction Co.**, of Austin, for concrete paving in Montague County; $226,599 to **Froemming-Kies**, of Corpus Christi, for concrete paving in Johnson County. Ohio, $227,655 to **Batdorf & Martin**, of Upper Sandusky, for roadside improvement in Crawford County; $409,601 to **R. Myers**, of Salem, Ind., for roadside improvement in Guernsey County. Michigan, $203,897 to **Weir Construction Co.**, of Detroit, for paving in Livingston County. New York, (Brooklyn) $193,694 to **B. Turecamo**, of Brooklyn, for granite repaving.

Construction Methods and Equipment

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MAY, 1937

The "How" of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How HOT RIVETS for big bridge were delivered from forge by pneumatic tubes. — p. 41

How MASS HOUSING PROJECT, providing 748 living units, was laid out on 22-acre site to minimize material handling. — p. 44

How LIGHTWEIGHT CONCRETE BLOCKS were used instead of hollow tile as back-up of exterior walls of buildings. — p. 44

How METAL-FACED PANEL FORMS, backed by plywood filler, made possible repeated use on building project. — p. 45

How HOMEMADE SAW utilized carborundum disk to cut glazed tile. — p. 46

How STEEL WINDOW FRAMES were anchored to walls by turnbuckle wire ties. — p. 47

How EQUIPMENT MAINTENANCE and repair on roadbuilding job were handled by trained mechanics. — p. 48

How ELECTRIC TOOLS were operated from truck-mounted welding generator. — p. 50

How TRACK TREADS, wrapped around pneumatic tires, increased traction of motor grader. — p. 50

How TIRE INFLATION was handled by small compressor on front end of truck. — p. 50

How CONCRETE PLACING for big dam was handled by 4-yd. cableway buckets. — p. 52

How WHIRLER CRANE was mounted on tall steel gantry to raise concrete buckets for dam construction. — p. 53

How BONDING of new concrete to old was done in raising height of dam. — p. 54

How LIFT SPAN for bridge was floated to place during high tide and seated on piers. — p. 56

How CONCRETE CANAL LINING was placed with aid of twin paving mixers and traveling form carriage. — p. 57

How EMBANKMENT SODDING was speeded by inclined moving platform on pneumatic-tired wheels. — p. 58

How BRICK CLEANING DEVICE salvaged paving block. — p. 58

How PAIR OF CRANES, working as team, placed 24-ton bridge girder. — p. 59

How SECTIONAL PLATE ARCHES of corrugated iron replaced old masonry bridge. — p. 59

How MIDGET GAS TANKS on workers' backs increased mobility of welders. — p. 59

How COMPRESSED AIR DISTRIBUTION was laid out for typical large construction job. — p. 61

How AIR REQUIREMENTS for dam project were estimated and tabulated. — p. 62

How HIGHWAY SIGNS are made and maintained at state-operated shop. — p. 68

ROBERT K. TOMLIN, Editor — WILLARD CHEVALIER, Vice-President

Editorial Staff: Vincent B. Smith, John B. Huttl (San Francisco), Paul Wooton (Washington), Nelle Fitzgerald

Made Jobs or *Stolen Jobs?*

As THIS IS WRITTEN Congress is pondering the President's message on relief in which he recommends an appropriation of $1,500,000,000 for work-relief during the year beginning July 1.

On the heels of the message, and even before Congress can digest the new budget, comes the usual barrage from those who would control the spending of this money. A dispatch to *The New York Times* quotes a WPA statement that "there always will be at least four million unemployed in the United States, even at the peak of prosperity, and the federal government must spend between $1,500,000,000 and $2,000,000,000 a year to provide the jobless with purchasing power to prevent business and industrial stagnation."

"High relief officials" are quoted as believing that "President Roosevelt had adopted such views as a permanent administration policy." These officials, moreover, are convinced that "if, during the new fiscal year, $1,500,000,000 should prove inadequate to finance relief operations, the President would ask Congress to provide additional funds."

It is not the purpose to comment here on the assurance with which WPA decrees that the federal treasury must support indefinitely four million unemployed or the complacency with which it assumes Presidential approval of its demand for a blank check. Neither is it intended to question here the brand of economics that would prevent business stagnation by taking $2,000,000,000 in taxes from the producers of the nation to enable non-producers to purchase the products of the producers who provide the funds.

HERE IT IS intended only to recall that Harry Hopkins, Administrator of WPA, recently declared that "the WPA's job is to create jobs." Whether or not this may be a proper function for a permanent federal department, it is in order to ask what he means by "creating" jobs. To create usually means to bring into being what hitherto has not existed. But it is not "creating jobs" to take over activities hitherto carried on by regular agencies of government through normal processes. Even when we allow for those new activities that WPA may actually have created, the fact remains that its public construction operations unquestionably have muscled in on normal public works activity.

It is true that under present conditions one cannot draw a hard and fast line between normal and "made" work. So long as state and local governments can share in the federal relief funds they will set up their projects on a basis that will insure their supply of "easy money." Thus otherwise normal work becomes "made" work, and relief workers paid from federal funds supplant the self-supporting citizens who normally would find employment if the local governments were spending their own funds through normal processes.

With such a set-up we shall continue to have as much unemployment as the federal government is willing to pay for, and we shall have it just as long as local governments feel that they can get something for nothing by putting their projects on a work-relief basis.

IF PROVISION for the deserving unemployed is a social responsibility and if the federal government elects to discharge it for the nation, it must devise ways and means to accomplish that purpose. Under the pressure of an emergency such as that of the last few years it may even be justified in diverting to social ends a certain amount of the normal public works construction and maintenance. But today we are in a period of advanced recovery. It is time to question the efforts of professional relief workers to fasten upon the nation a program for the permanent socialization of a substantial share of its public construction activities.

Such a program not only would subsidize waste and inefficiency in the expenditure of vast public funds, it would be also an attack upon the well-being and security of every business and every worker whose livelihood depends on construction activity. As such this whole effort to perpetuate work-relief as a public construction function calls for the sustained vigilance and opposition of the organized construction industry.

Willard Chevalier

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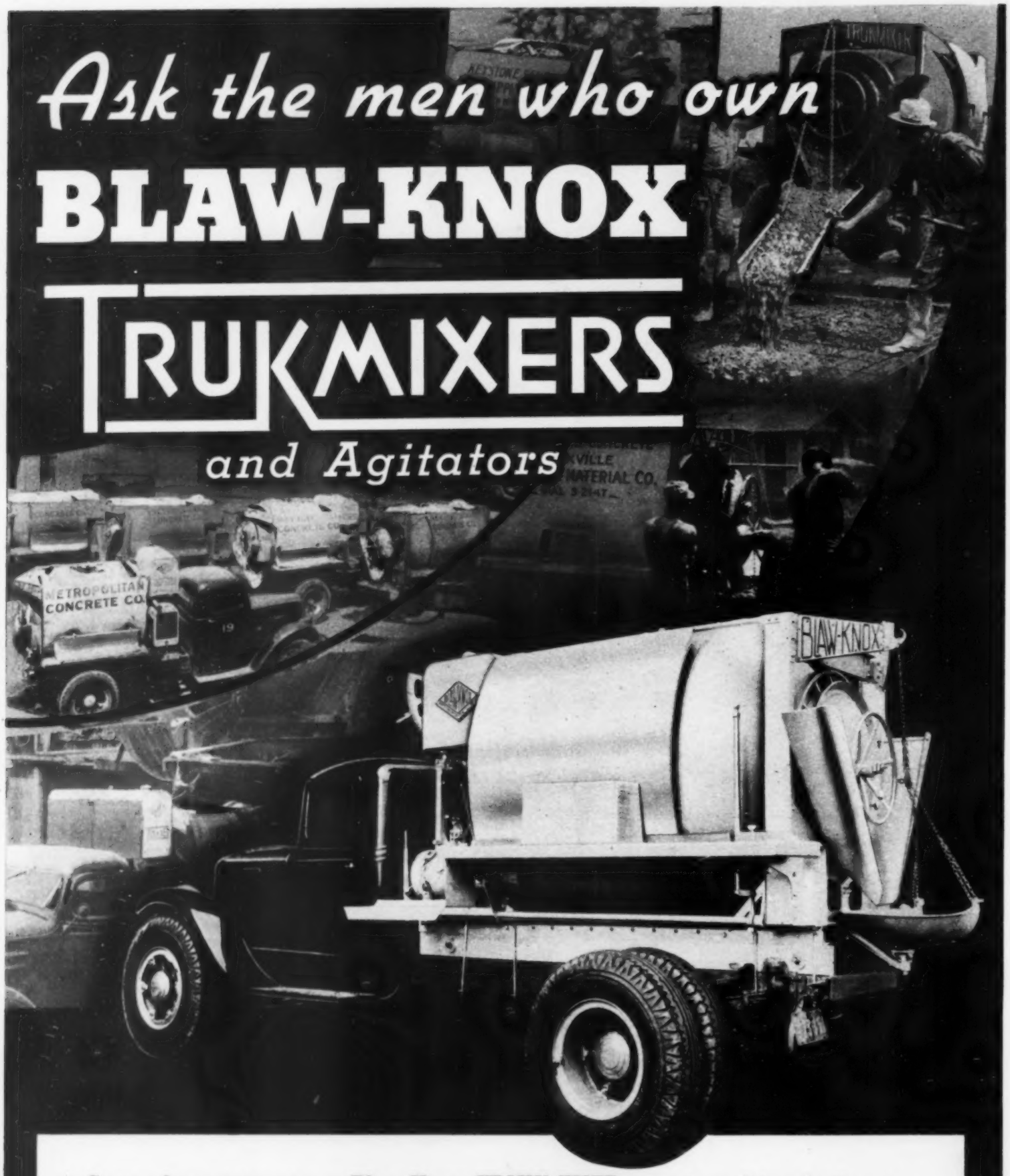

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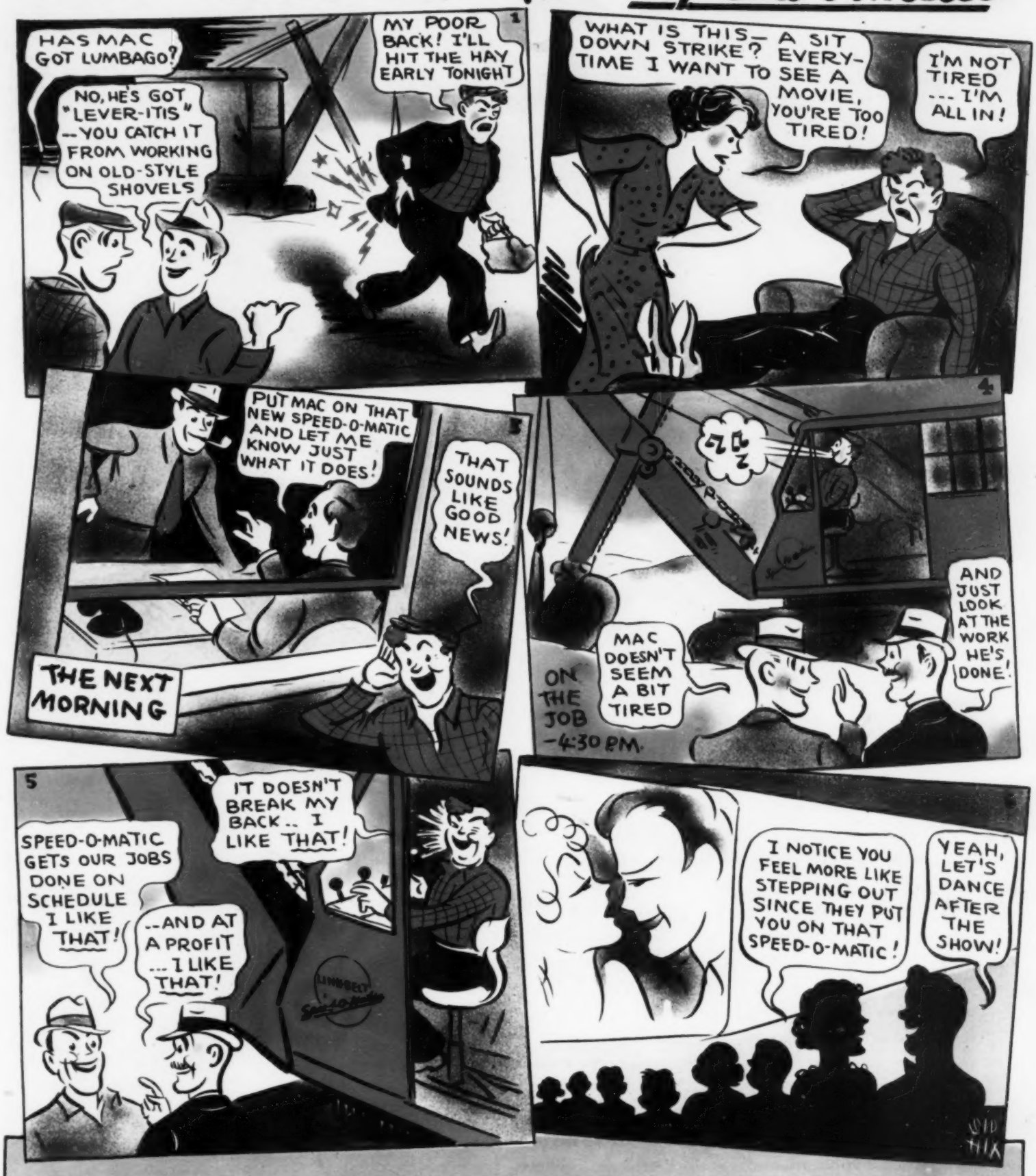
1
HAS MAC GOT LUMBAGO?
NO, HE'S GOT "LEVER-ITIS" --YOU CATCH IT FROM WORKING ON OLD-STYLE SHOVELS
MY POOR BACK! I'LL HIT THE HAY EARLY TONIGHT
WHAT IS THIS— A SIT DOWN STRIKE? EVERY-TIME I WANT TO SEE A MOVIE, YOU'RE TOO TIRED!
I'M NOT TIRED --- I'M ALL IN!
3
PUT MAC ON THAT NEW SPEED-O-MATIC AND LET ME KNOW JUST WHAT IT DOES!
THAT SOUNDS LIKE GOOD NEWS!
THE NEXT MORNING
4
MAC DOESN'T SEEM A BIT TIRED
ON THE JOB -4:30 P.M.
AND JUST LOOK AT THE WORK HE'S DONE!
5
SPEED-O-MATIC GETS OUR JOBS DONE ON SCHEDULE I LIKE THAT!
IT DOESN'T BREAK MY BACK.. I LIKE THAT!
--AND AT A PROFIT ...I LIKE THAT!
I NOTICE YOU FEEL MORE LIKE STEPPING OUT SINCE THEY PUT YOU ON THAT SPEED-O-MATIC!
YEAH, LET'S DANCE AFTER THE SHOW!

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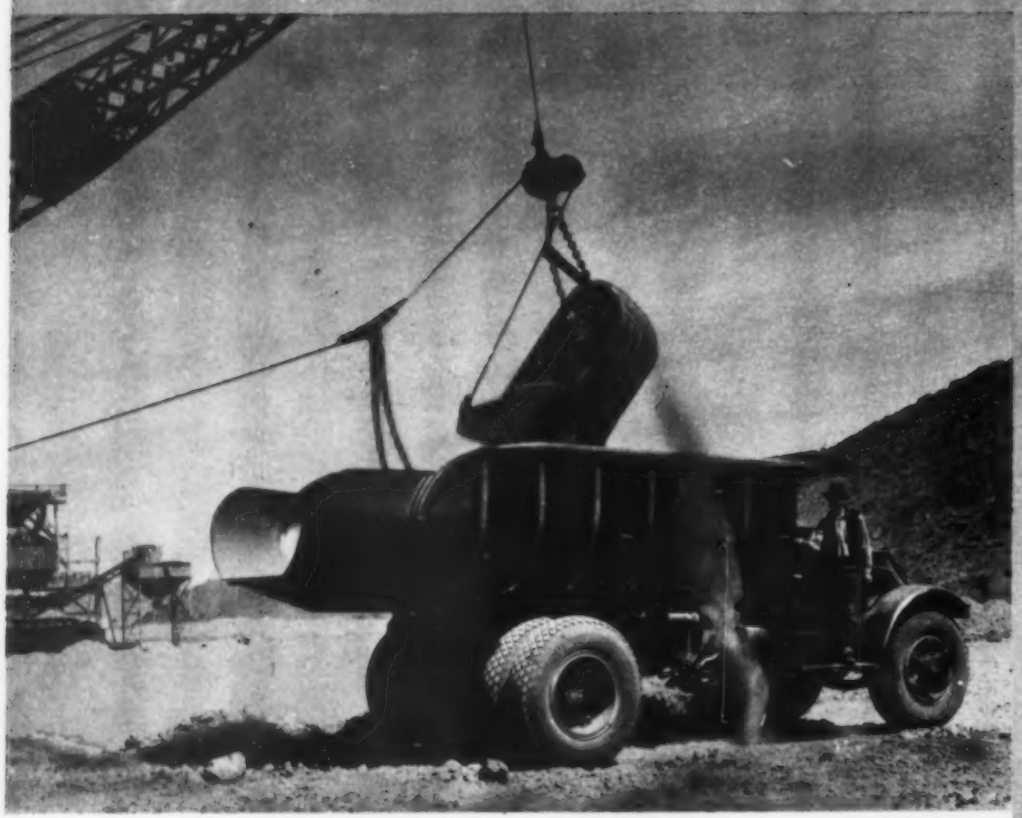

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CRANE . . . . . .
DRAGLINE . . . .
TRUCK SHOVEL
TRUCK CRANE

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No. 12 Hydraulic Control Grader at work on farm to market road in Northern Wisconsin.

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OR LOW COST GRADING

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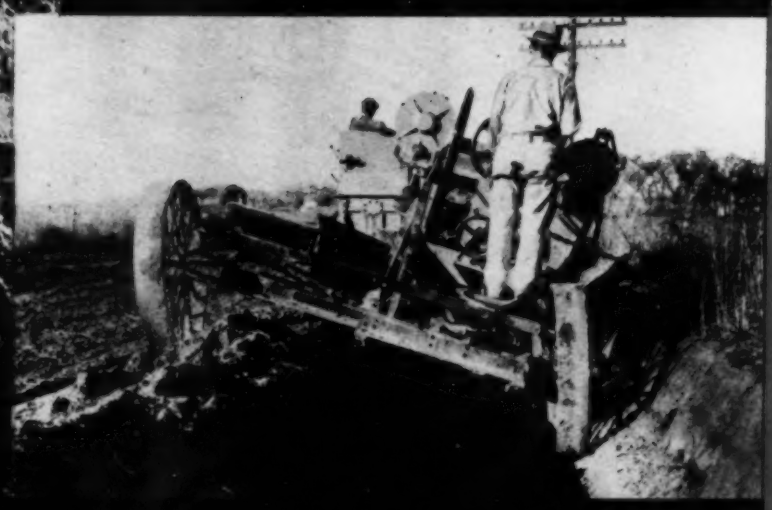

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80,000 MILES OF ROEBLING WIRE USED IN MAIN CABLES

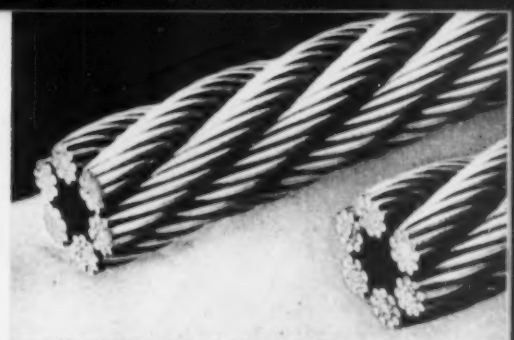
The New King

OF SUSPENSION BRIDGES STARTS HIS REIGN !

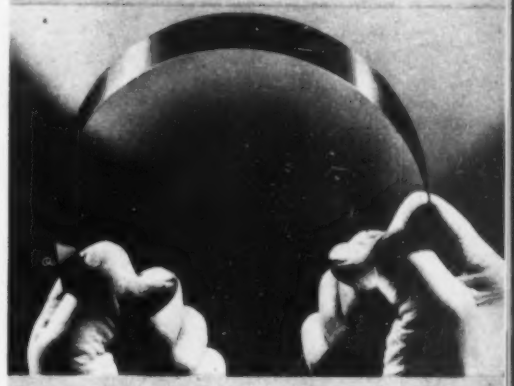
Golden Gate . . . mighty monarch of suspension bridges . . . soon will be opened to traffic. Thrown across the extreme outer mouth of San Francisco's famous harbor, it has the longest main span in the world . . . almost three times the main span length of the well-known Brooklyn Bridge. ● Main cables . . . spun by Roebling . . . are the longest and largest in existence. Cross-sectional metallic area: 830 square inches. Weight per lineal foot: 2850 pounds. Length (each): almost 1½ miles. 22,000 tons of Roebling Open Hearth Acid Steel Wire are contained in the two main cables. Total length of wire: 80,000 miles . . . enough to girdle the globe three times. ● John A. Roebling's Sons Co., Trenton, N. J. Branches in Principal Cities.

CABLES SPUN BY

ROEBLING



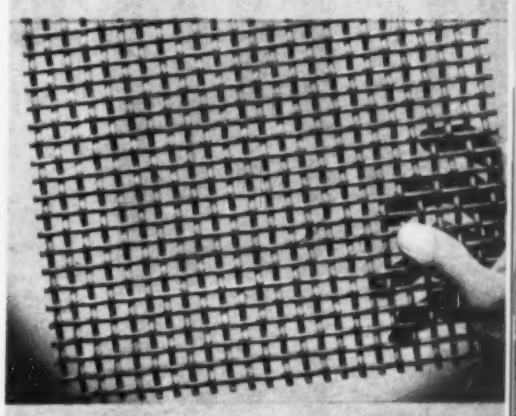
WIRE ROPE



FLAT WIRE

WELDING WIRE

ELECTRIC WIRE



WIRE FABRIC

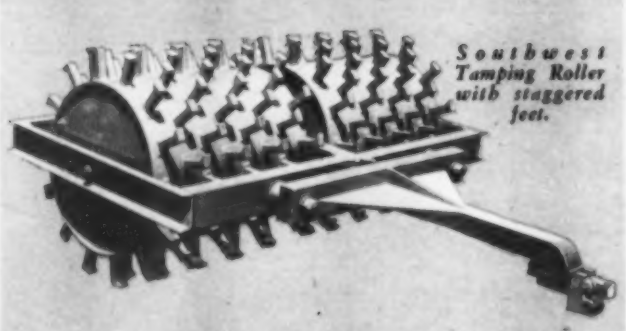
LUCAS WELDED EXCAVATORS

IT'S ALL IN THE WAY THEY'RE BUILT

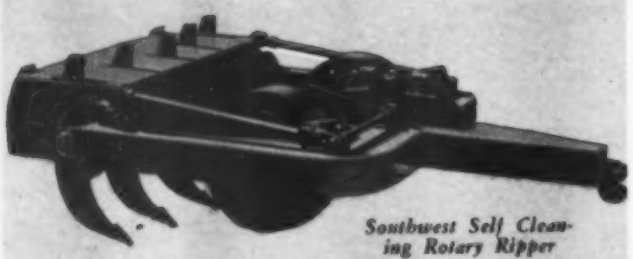
Southwest Carry Scraper, revolutionary design, minimizes operating load on tractor and cables. 6, 8, 10 and 12 yard capacity.

Southwest Bottomless type Scraper takes accurate cuts from thinnest layer to 10" deep.

Southwest Heavy Duty Ripper tears up old gravel or macadam roads. All welded steel box construction, with cable or hydraulic control.



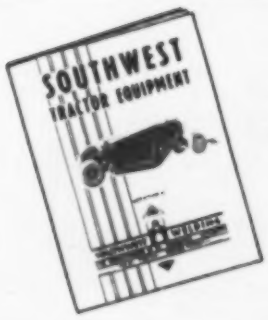
Southwest Tamping Roller with staggered feet.



Southwest Self Cleaning Rotary Ripper

Southwest Tractor Equipment covers the full range of earth moving and heavy contracting operations, and meets the most rigid government, state and engineering specifications. Designed and built in a plant that has specialized on heavy steel fabrication for more than twenty-five years, these units have the strength and endurance that result from long experience and the use of exclusive processes. Tried and proved under severe conditions in all classes of road building, digging and earth moving, these implements will be found to have many desirable features for saving power and reducing operating expense, with marked impovements in performance.

SOUTHWEST WELDING & MFG. COMPANY
Alhambra • California



New descriptive Bulletin with illustrations and specifications now available. Send for your copy.

SOUTHWEST TRACTOR EQUIPMENT

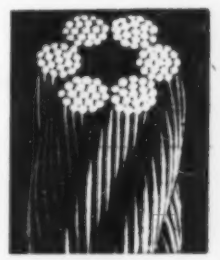
You *Resist Fatigue* better with RUBBER HEELS..

..Wire Rope *Resists Fatigue longer when* PREFORMED

● Rubber heels very effectively reduce the strain and internal muscular stress of walking. They help you resist fatigue.

The preforming process very effectively reduces the internal torsional stress from within the wires and strands of wire rope. This reduction of stress and strain helps preformed wire rope resist fatigue—and therefore it lasts longer.

But not only does preforming tend to eliminate internal torsional stress, but it makes a rope that is flexible and limber, easy to handle, and one that resists kinking. Preformed rope requires no seizing when cut. It splices easily, runs true and spools perfectly. For many jobs preformed rope will give you much greater dollar value. Ask us to send you a sample of preformed rope. It will come to you without obligation or salesman's "follow-up."



PREFORMED

NON-PREFORMED

LICENSEES UNDER PREFORMED WIRE ROPE PATENTS

Educational Bureau • 520 North Michigan Avenue • Chicago, Illinois

Preformed WIRE ROPE

for SAFETY • ECONOMY • EFFICIENCY

TAKE IT . . . TRY

ON THE FILL. For shaping and compacting the fill, a "Caterpillar" Diesel Tractor equipped with LaPlant-Choate Roadbuilder followed the dumping units—and a "Caterpillar" No. 66 Grader, hauled by one of the Diesels, did the finishing work.

CATERPILLAR

REG. U. S. PAT. OFF.

IT ON *your job!*

HERE'S WHAT DIESEL POWER DID FOR CHANDLER BROS.

CHANDLER BROS. of Pinnacle, N. C., proved what the right equipment can do by putting a "Caterpillar" fleet to work on their highway contract in the North Carolina foothills. Four Diesel Tractors, a Diesel-powered Shovel and a No. 66 Grader moved 280,000 yards at the rate of 80,000 a month—and produced big results at lowest cost.

Much of their success was due to the choice of the right equipment for each type of work encountered. Find out what this can mean to *your* jobs—in lower costs, faster schedules. Tell your dealer you are ready to be *shown* just how "Caterpillar" Diesels can help you most

ON LONG HAULS WITH TRACTOR AND WAGONS. Chandler Bros. used this "Caterpillar" Diesel-powered Lorain Shovel loading into Athey cradle dump wagons pulled by "Caterpillar" Diesel Tractors for the type of work this combination does best—long hauls and rock loads.

ON SHORT HAULS WITH TRACTOR AND SCRAPERS. This big-capacity combination of "Caterpillar" Diesel RD8 Tractor and LeTourneau Carryall Scraper brings lowest cost per yard where the haul is short and the dirt free from rock.

TRACTOR CO.
PEORIA, ILL.

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES,
TRACK-TYPE TRACTORS AND ROAD MACHINERY

LAPLANT-CHOATE

ROADBUILDERS

STRENGTH EFFICIENCY ADAPTABILITY

"LAPLANT-CHOATE ROADBUILDERS HANDLE NICE"

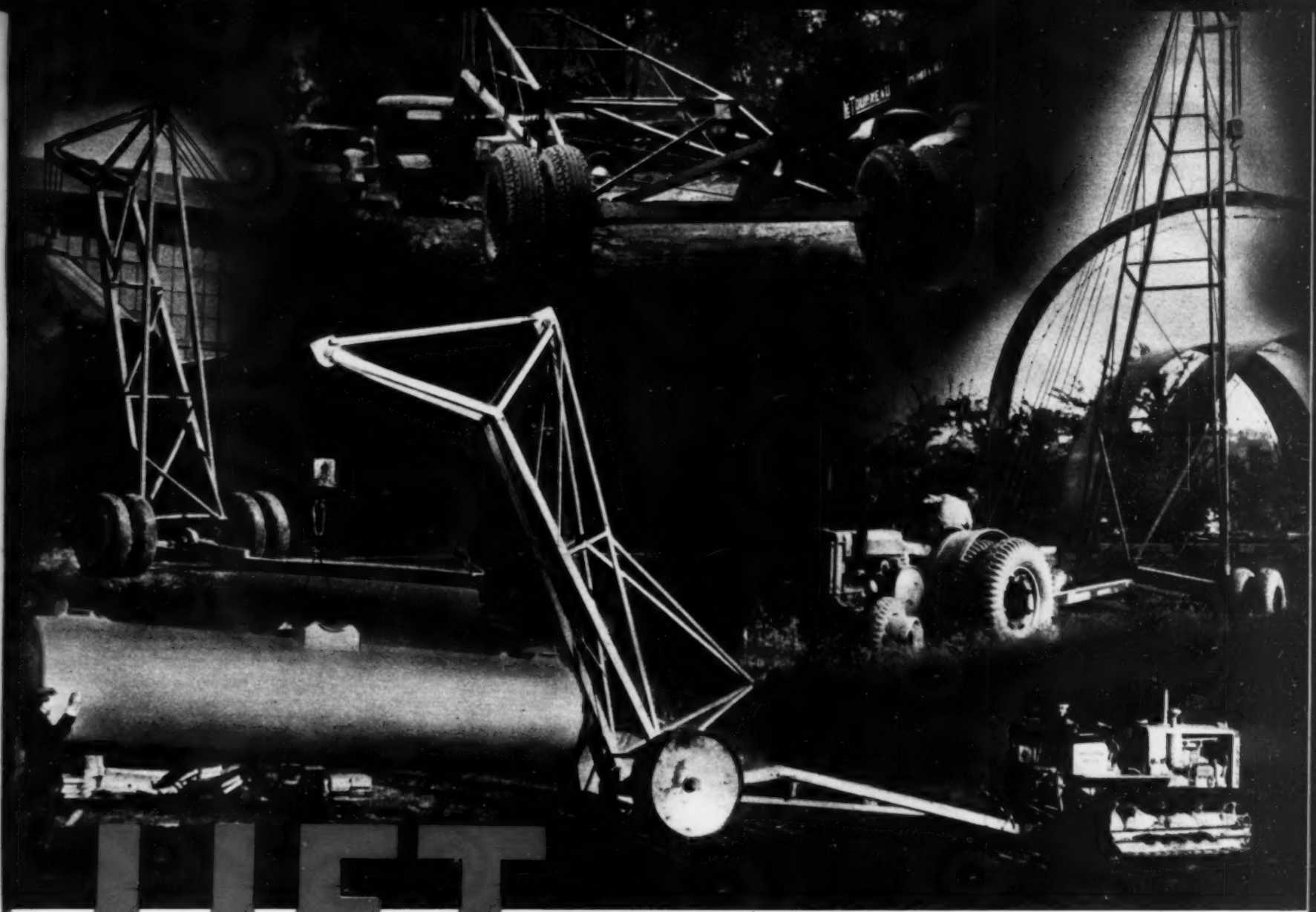
For Use With Caterpillar Tractors Exclusively

The above is a common expression among operators of LaPlant-Choate Roadbuilders mounted on "Caterpillar" Tractors. Hydraulic control is positive and accurate. The Roadbuilder can thus be adjusted to any angle or height . . . quickly and easily! All of which means faster work and better work! Modern service requires the use of modern equipment. NEW LaPlant-Choate equipment is an investment which will help you get jobs and make larger profits.

LaPlant-Choate Manufacturing Company is an outstanding pioneer in the field of hydraulically-operated equipment for "Caterpillar" Tractors. LaPlant-Choate Roadbuilders support every claim for strength, efficiency, and adaptability . . . by actual performance! And this performance meets TODAY'S requirements of speed and economy. If your Roadbuilders are outmoded, if your Roadbuilders are not capable of doing your work faster and cheaper . . . then you need NEW LaPlant-Choate Roadbuilders! See your nearest "Caterpillar" Dealer or write at once direct to LaPlant-Choate Manufacturing Company, Inc.

BULLDOZERS • SCRAPERS • TAMPING ROLLERS • RUBBER WHEELED WAGONS • BRUSH CUTTERS • SNOW PLOWS

LaPlant-Choate Mfg. Co. Inc.
CEDAR RAPIDS, IOWA



LIFT YOUR LOADS WITH A LeTOURNEAU TRACTOR CRANE

The mobility of the LeTourneau Tractor Crane gets it to jobs quickly; its ability to maneuver enables it to lift, move and place heavy, awkward loads in narrow quarters. Its line speed (50 to 400 feet per minute, depending on sheave reeving) and the accurate control possible through the LeTourneau Power Control Unit make for quick handling of all loads. Its long tongue makes a counter-balance of the tractor's weight, thus increases the Crane's leverage over the load and so greatly increases the load that can be handled. Stout, all-welded steel construction gives it a maximum of strength with light weight.

It can be quickly attached or detached from any tractor fitted with a double drum Power Control Unit . . . the same Power Control Unit that operates LeTourneau Carryall Scrapers, or a Bulldozer, and Rooter, Angledozer, etc.

Ask your "Caterpillar" tractor dealer to show you what the LeTourneau Crane can do for you.

. . . For moving machinery and heavy materials; placing culverts, timbers and structural forms; loading and unloading trucks and cars; erecting steel forms and poles, etc.

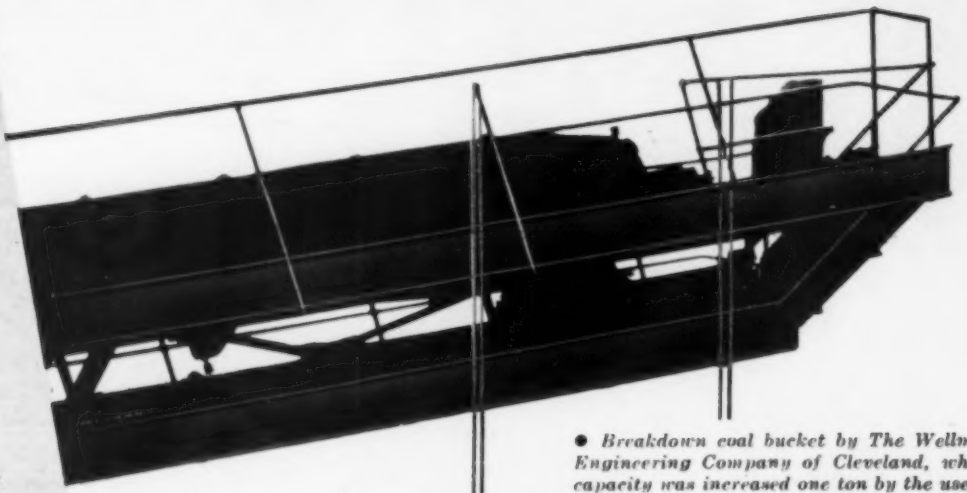
LETOURNEAU

R. G. LeTOURNEAU, INC. • Peoria, Illinois • Stockton, California • Cable Address: "BOBLETORNO"

Manufacturers of . . . ANGLEDOZERS*, BUGGIES*, BULLDOZERS, DRAG SCRAPERS, POWER CONTROL UNITS, CARRYALL* SCRAPERS, CRANES, ROOTERS*, SEMI-TRAILERS.

*Name Registered U. S. Patent Office.

BIGGER PAY LOADS



● *Breakdown coal bucket by The Wellman Engineering Company of Cleveland, whose capacity was increased one ton by the use of "Yoloy", a Nickel-copper steel produced by The Youngstown Sheet and Tube Company, Youngstown, Ohio. The low air-hardening property of "Yoloy" makes it ideal for welded construction and in many instances, eliminates the necessity for thermal stress relief.*

. . . *with these weight-reducing*

LOW-NICKEL ALLOY STEELS

● Useless weight is steadily going out of date in material handling equipment. For with the high strength-weight ratios of the Nickel Alloy Steels now available, the obvious economies are too great to be ignored.

Pictured here are two applications where the use of tough, strong, low-alloy Nickel-copper steels effected weight savings as high as 25%.

The large breakdown coal bucket was increased from six to seven ton maximum capacity without increase in the weight of the bucket... providing at the same time increased resistance to impact, abrasion and corrosion.

Even more significant are the reductions in weight in the coal-handling units shown below at the right. Hoppers on these trucks formerly weighed 4,600 pounds but when Nickel-copper steel was adopted, weight was brought down to 3,500 pounds.

Typical examples these, of what is happening throughout the construction equipment industry through the use of Nickel Alloy Steels.

Consultation on your problems involving the use of Nickel is invited.

● *Hoppers on these trucks, built by Euclid Road Machinery Company, reduced 1100 lbs. in weight by employing "Yoloy".*

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

NOW—A 16-YARD

ATHEY FORGED-TRAK 2-WAY DUMP TRAILER!

THESE FAMOUS 2-WAY FEATURES WILL LOWER YOUR YARDAGE COSTS

Dumps to right or left . . . down folding side gates are fully open when body is raised 18° from horizontal . . . 55° dumping angle . . . easy to spot and to turn, increasing the efficiency of loading units . . . low loading height . . . loads dumped clear of the wheels . . . Athey Forged-Trak self-cleaning, non-clogging wheels.

SEE YOUR "CATERPILLAR" DEALER —OR WRITE US

TAKES ADVANTAGE OF GREATER TRACTOR POWER NOW AVAILABLE . . . Works hand in hand with the "Caterpillar" RD8 Tractor to haul larger capacity loads anywhere, in any weather . . . augments the well-known Athey Forged-Trak line.

MOUNTED ON 30-TON ATHEY FORGED-TRAK WHEELS . . . The first 2-Way unit mounted on actual capacity wheels of this size . . . another forward step in Athey Forged-Trak equipment!

A GENERAL-UTILITY UNIT . . . assures better, quicker handling of dirt, rock, sand or mixed materials. All the famous Athey Forged-Trak 2-Way Features—PLUS greater capacity.

ATHEY TRUSS WHEEL CO.

5631 West 65th Street • Chicago, Illinois
Cable Address: *"TRUSSWHEEL,"* Chicago

ATHEY Forged-Trak (REG. TRADE MARK) 2-WAY DUMP TRAILERS

Capacities from 10 to 16 Yards

BUCYRUS-ERIE *Presents*

the NEW 33-B 1¼-YARD SHOVEL-DRAGLINE CLAMSHELL-CRANE

Speed With streamlined speed throughout, the new Bucyrus-Erie 33-B sets new performance and output standards in the 1¼-yard field. You get quicker starting, quicker stopping, accurate control with its smooth, balanced digging cycle. A longer upper boom section increases work range; easier maneuverability and accurate steering saves move-up time.

Power rides direct to the dipper teeth on anti-friction bearings, through a straight-line gear-train and two-part hoist. The 33-B stands up squarely to its digging with a wide-base, box girder, all-welded boom. A simple chain-crowd gives a powerful thrust to the dipper. You have the choice of gasoline, Diesel, or electric power.

Endurance Simplified construction, modern use of electric-welding, tough steel alloys and special heat-treating especially developed for excavator service, insure continuous, trouble-free performance.

Write today for full information on this new 1¼-yard winner.

BUCYRUS ERIE

EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

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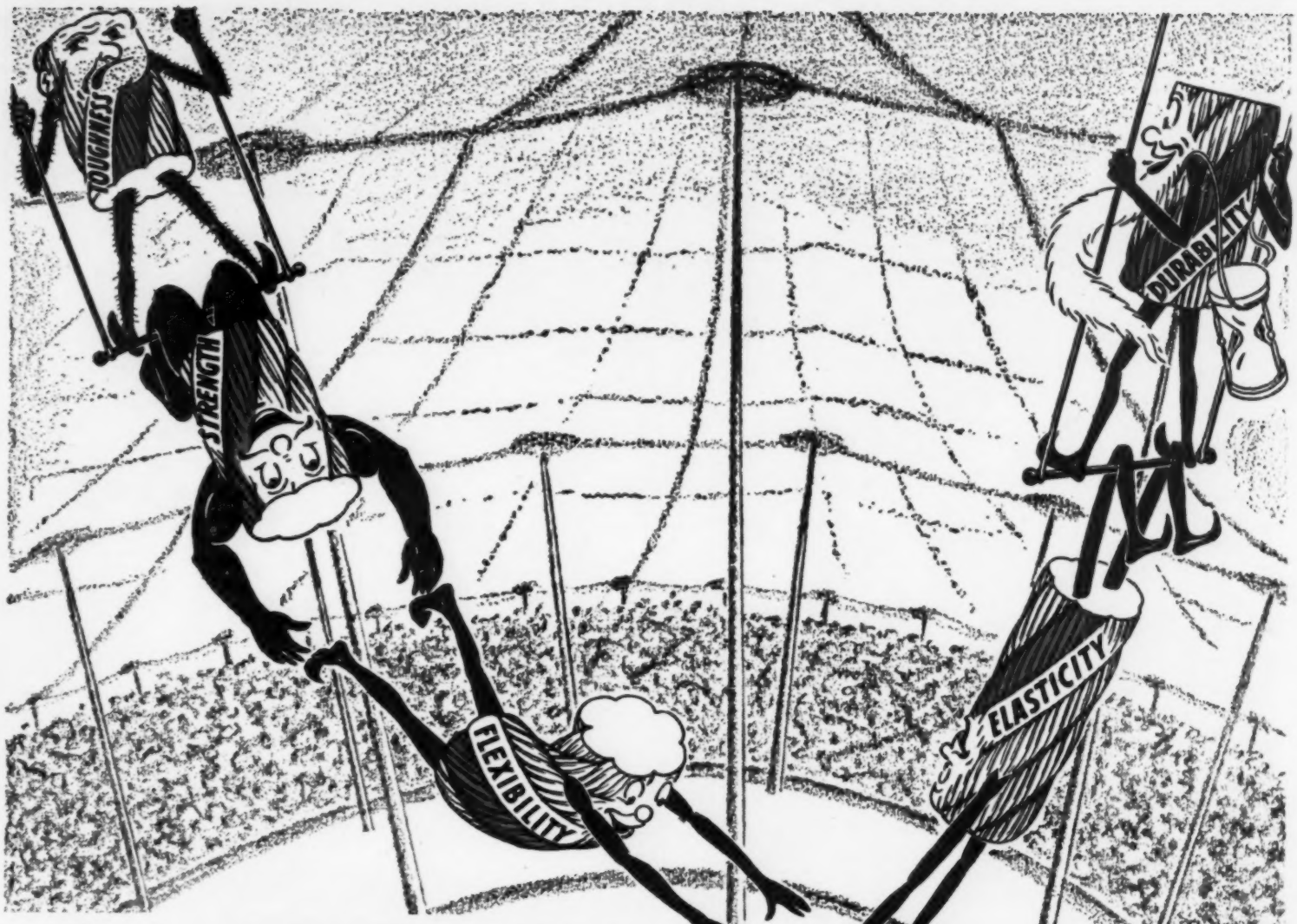


Years OF TRAINING ARE NECESSARY *for* SKILLED PERFORMANCE

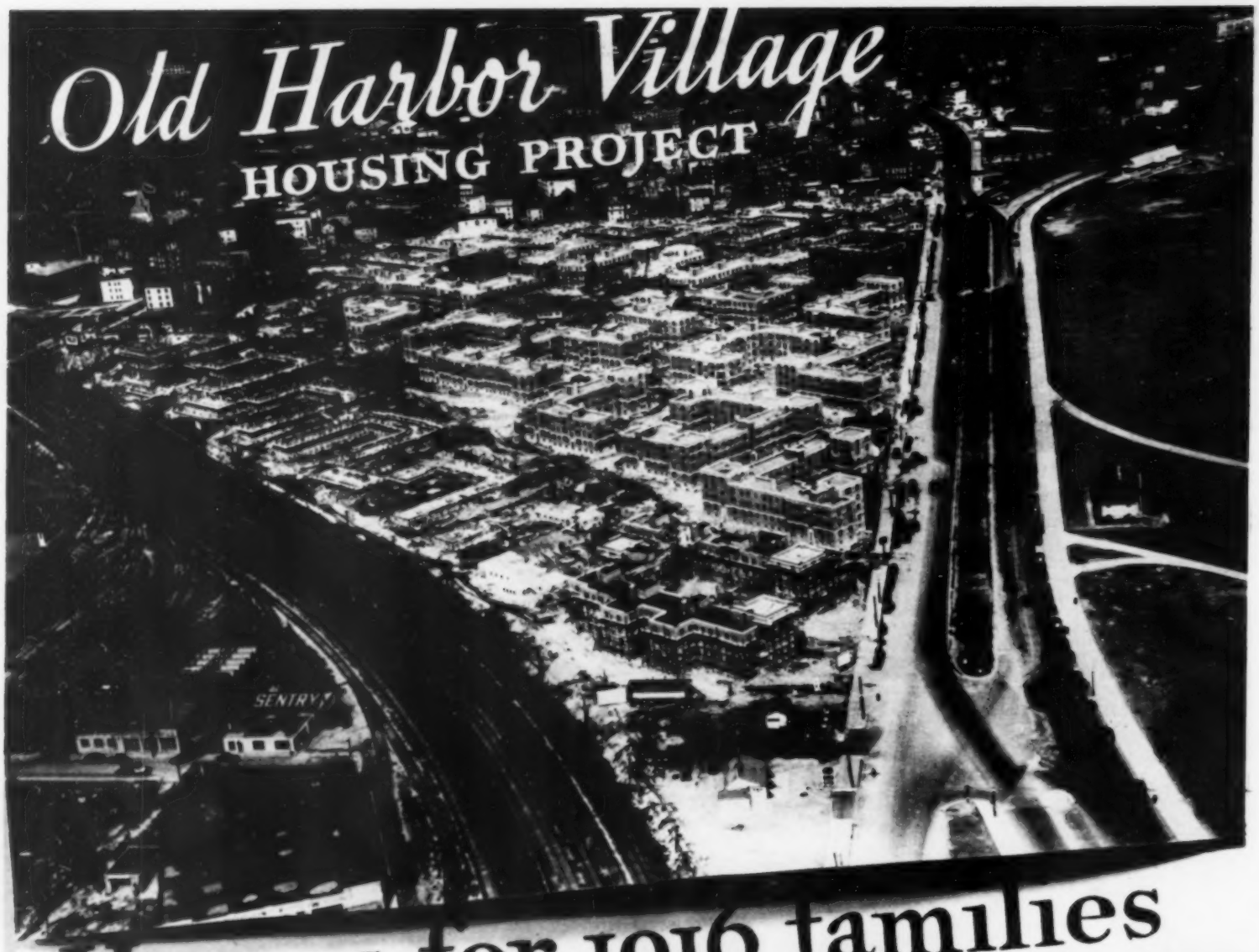
EIGHTY years ago the foundation of A. Leschen & Sons Rope Co. was laid. Through the accumulated experience and attainments of these years have come the standards which result in the ultimate achievement—the perfectly balanced "HERCULES" (Red-Strand) Wire Rope—the rope which contains the vital elements of Elasticity Flexibility, Durability, Toughness and Strength—all present to a maximum degree in *balanced proportion.*

When buying wire rope remember these five essential characteristics . . . your selection will be "HERCULES" (Red-Strand) because this rope contains all of them—and all of them in perfect balance.

Made Only By **A. Leschen & Sons Rope Co.** Established 1857

5909 Kennerly Avenue, St. Louis, Mo.

New York	90 West Street	San Francisco	520 Fourth Street
Chicago	810 W. Washington Blvd.	Portland	914 N. W. 14th Avenue
Denver	1554 Wazee Street	Seattle	2244 First Avenue South



Aerial photograph by courtesy of J. F. Hartley

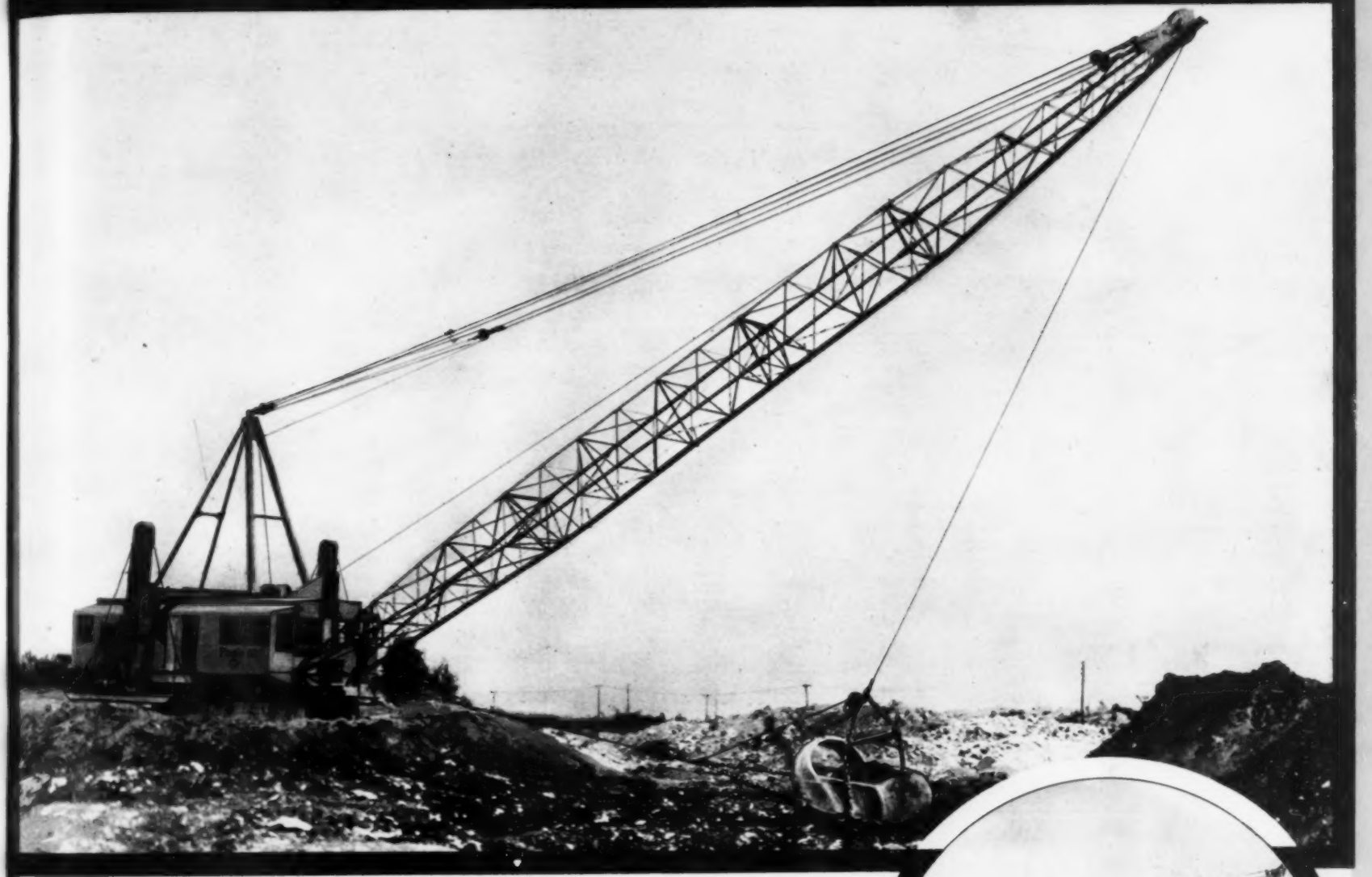
This government project at South Boston, Mass., is the third largest housing development in the United States. It covers 34 acres and will cost $6,600,000. To meet the requirements of the concrete work with greater efficiency and economy, early in the operation the contractor substituted Lehigh Early Strength Cement for normal portland cement in floor and roof slabs. With Lehigh Early Strength Cement, waiting time for curing concrete was reduced two-thirds—in cold weather forms were removed and re-used in 2 to 3 days, thus reducing form lumber requirements by $2500—heating cost for cold weather protection was reduced two-thirds—labor cost reduction was $20 a day for 70 days.

The Old Harbor Village Housing Project No. H. 3302, now in course of construction at South Boston, Mass. This development consisting of 34 apartment blocks was designed for Housing Division P. W. A. by the Seventeen Associated Architects, J. D. Leland, Chief. Matthew Cummings Co., 43 Tremont St., Boston, Mass., is the contractor.

Compared to normal portland cement, Lehigh Early Strength Cement makes concrete of equal strength in one-third to one-fifth the time. Contractors use it to save time, to reduce costs and to coordinate construction schedules. Write for copy of 32-page book, "Lehigh Early Strength Cement—What it is, what it does, and what it can be used for."

LEHIGH PORTLAND CEMENT COMPANY, ALLENTOWN, PA., CHICAGO, ILL., SPOKANE, WASH.

Page High Yardage WALKING DRAGLINE



Moderately Priced—Three to Five Yard Machines Immediately Available

Diesel powered—by a heavy duty horizontal engine designed particularly for dragline use.

High—load—hoist—and swing speeds.

Large circular base. Machine can work on the softest ground without mats or danger of miring down.

Fairlead, drums, and sheaves designed to reduce cable wear.

Simple positive crank action walking mechanism, moves machine on the softest ground, walks immediately in any direction three steps per minute. Reduces machine's original cost.

Before buying any dragline, learn what the Page Walker can do on your job! For information write—

Page Engineering Co.

Clearing Post Office • • Chicago, Ill.

PAGE AUTOMATIC DRAGLINE BUCKETS
PAGE WALKING DRAGLINE MACHINES
PAGE DIESEL ENGINES

PAGE ENGINEERING COMPANY
CLEARING POST OFFICE CHICAGO, ILLINOIS

Please send information on a Page "600" Walker. Size _____

Name _____

Address _____

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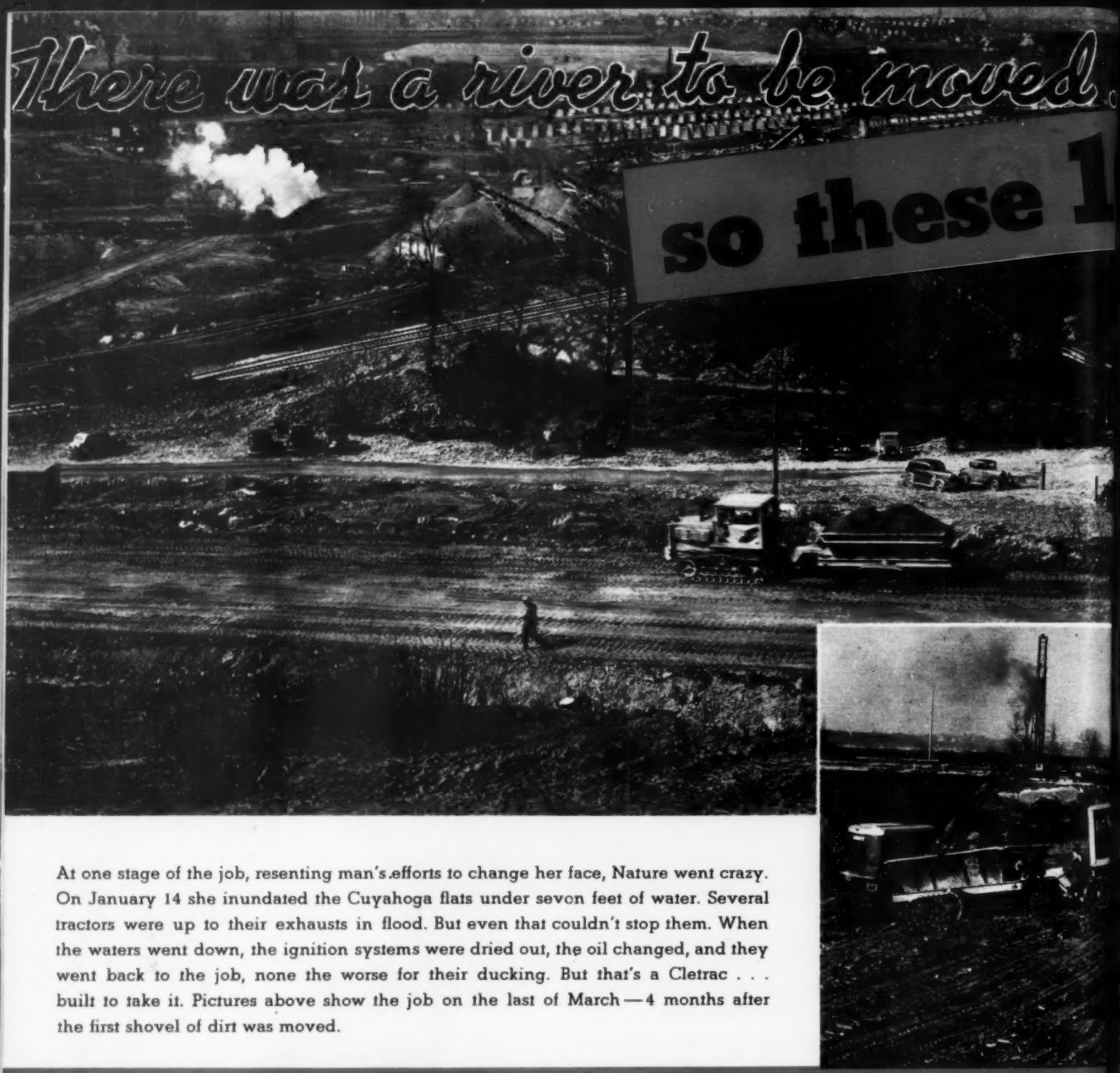


At one stage of the job, resenting man's efforts to change her face, Nature went crazy. On January 14 she inundated the Cuyahoga flats under seven feet of water. Several tractors were up to their exhausts in flood. But even that couldn't stop them. When the waters went down, the ignition systems were dried out, the oil changed, and they went back to the job, none the worse for their ducking. But that's a Cletrac . . . built to take it. Pictures above show the job on the last of March—4 months after the first shovel of dirt was moved.

Cletrac

Crawler Tractors

Diesel, Tractor Fuel, Gasoline . . . Six Size . .

10 Cletracs went to work

Relocating the channel of the Cuyahoga River in Cleveland more than a thousand feet away . . . moving three-quarters of a million yards of dirt . . . building a many million dollar steel mill in nine months' time — that was the job that faced Hunkin and Conkey, General Contractors and A. B. Cable Construction Company, in charge of excavation.

From past experience they knew that Cletracs would be equal to the task. Ten of them were put to work.

The first load of dirt moved last December. Day and night, seven days a week the work went on. In mud and mire that actually scraped their transmission cases, these Cletracs pulled their wagons and self-loading scrapers and levelled the fill to keep a tough job up to schedule.

Cletracs ask no favors when the going gets hard. Tough job or easy one, they take it in their stride.

With their heavy main frame and side frames . . . their solid construction throughout, Cletracs do more work, do it better, and last longer.

With their controlled differential steering . . . an exclusive feature . . . Cletracs are more easily controlled, safer on the hills, handle larger loads on grades and on turns, and pull with both tracks at all times.

Investigate the Cletrac. See for yourself how its "Built to Endure" construction helps safeguard profits on closely bid jobs.

The Cleveland Tractor Company, Cleveland, Ohio

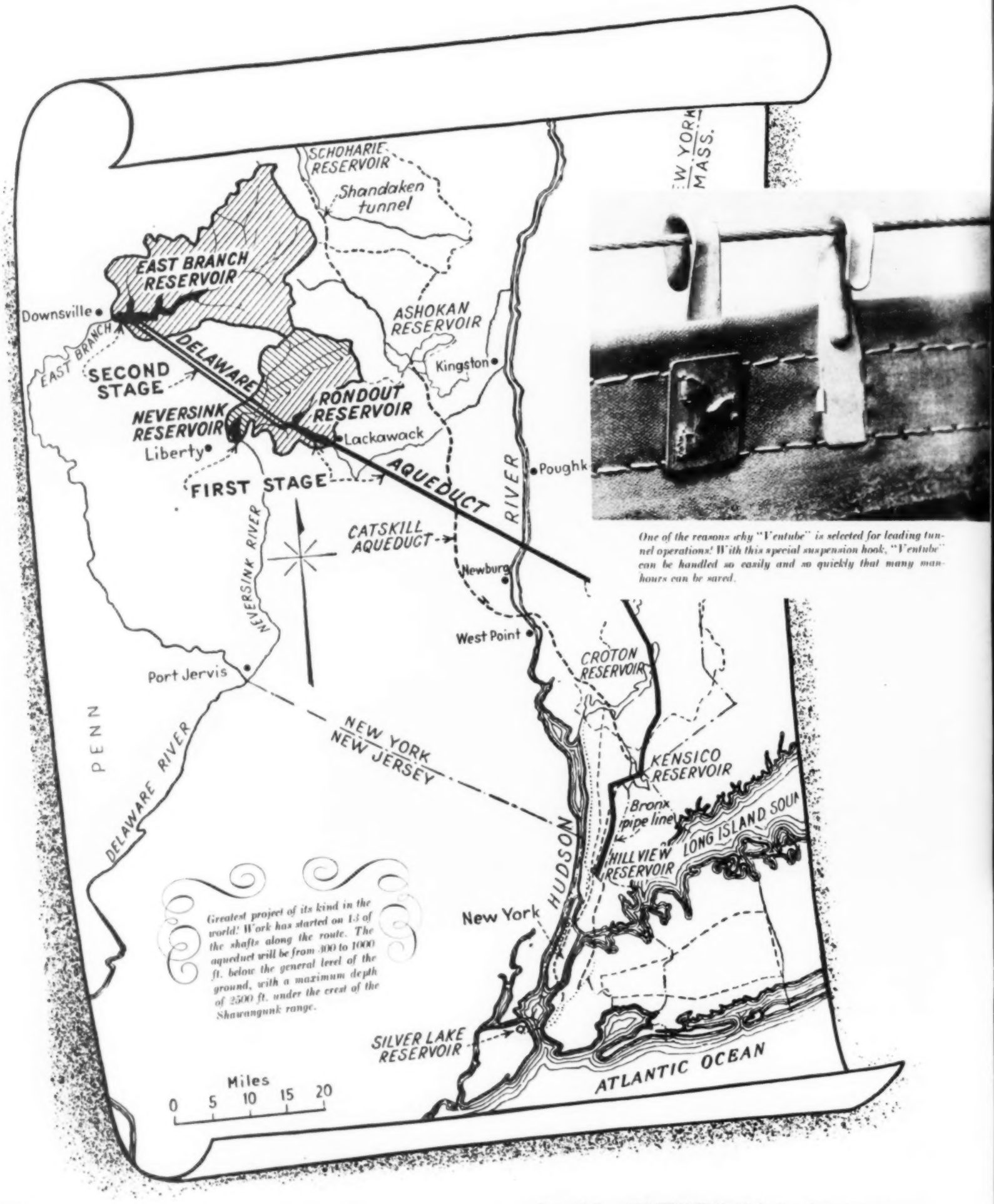
In mud and mire that actually scraped the transmission case, these Cletracs work on. This ability to keep going is the natural result of sound engineering, proper balance of weight and power, and controlled differential steering.

Cletrac
REG. U.S. PAT. OFF.
Crawler Tractors
Built To Endure

The only tractors with controlled differential steering that keeps both tracks pulling at all times . . . on the turn as well as on the straightaway.

ze . . . Fifteen Models . . . 22. to 94. Horsepowe

"VENTUBE" *starts its service*

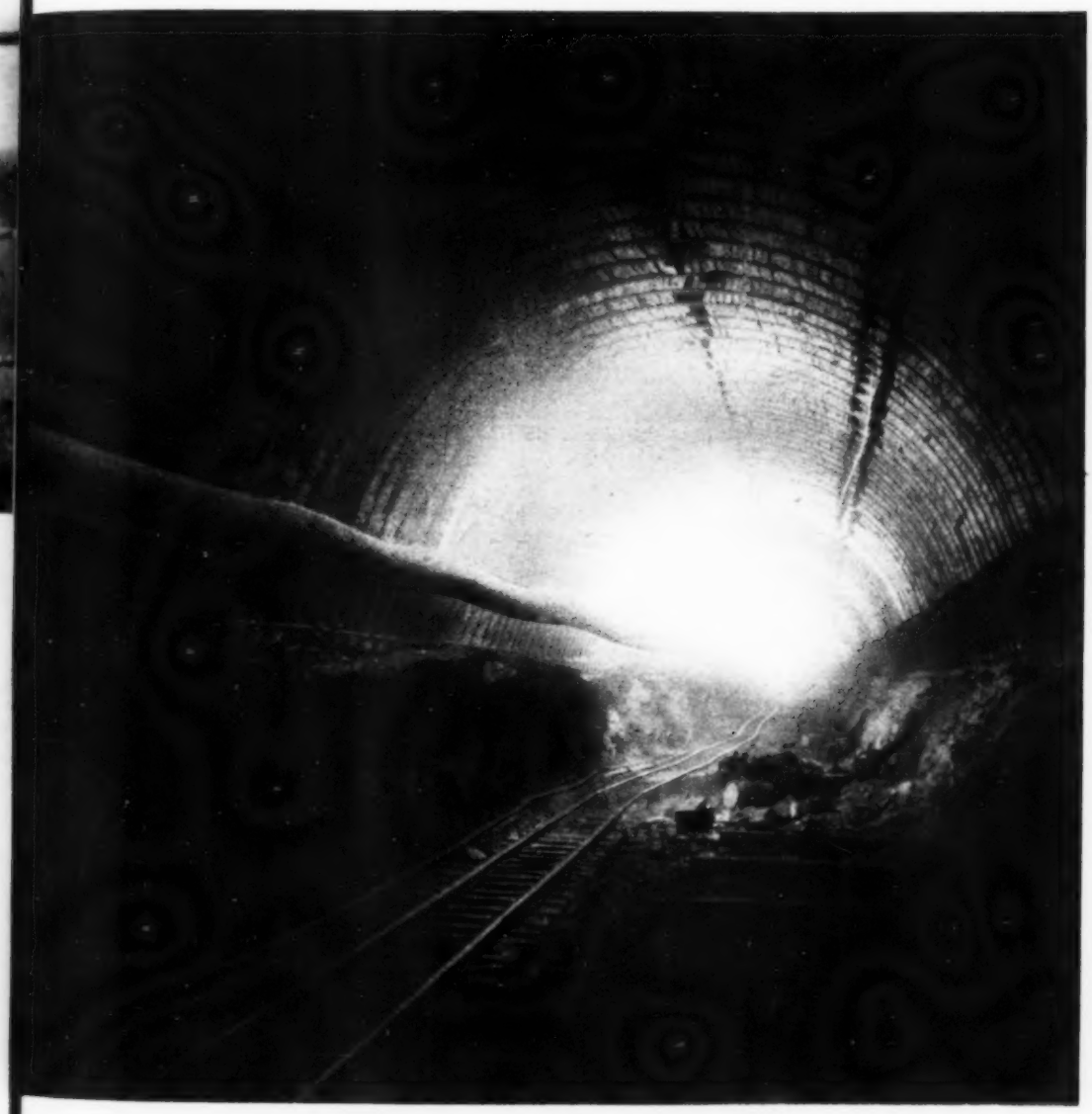


Greatest project of its kind in the world! Work has started on 13 of the shafts along the route. The aqueduct will be from 300 to 1000 ft. below the general level of the ground, with a maximum depth of 2500 ft. under the crest of the Shawangunk range.

One of the reasons why "Ventube" is selected for leading tunnel operations! With this special suspension hook, "Ventube" can be handled so easily and so quickly that many man-hours can be saved.

on ANOTHER record job!

WORK BEGINS ON NEW YORK CITY'S DELAWARE AQUEDUCT



ANOTHER record-size tunnel job gets under way—and again du Pont "Ventube" flexible mine tubing is used! There are good reasons why Jute "Ventube" is so often chosen for major engineering jobs—why, for example, it is being used by Army engineers for tunneling operations at Fort Peck—why it's used for exhausting dust from the working face of New York's Sixth Avenue Subway, why it's used in hundreds of other projects throughout the world.

"Ventube" saves time. That means reduced man-hours—and real savings in tunnel driving costs. "Ventube" is quickly hung. It can be withdrawn from the working face before blasting in a few minutes. After the blast, it can be thrown up to the working face again with the same rapidity, exhausting gases and permitting a quicker return to work by the shift.

Jute "Ventube" is made of extra-heavy, long-fibered Hessian cloth, *both impregnated and coated with rubber* by a special process that makes this type of flexible tubing the toughest and strongest on the market. Its tear resistance is as great in the warp direction as it is in the filler. There's no weak spot to rip or tear under the tremendous force of concussion. It is built to stand up under the worst possible conditions encountered underground. Acids, alkalis, fungus growth and other destructive agencies cannot harm it.

If you are not using "Ventube" now, why not try a few sections leading up to the working face and observe it under actual tunneling conditions? Distributors spotted for quick service!

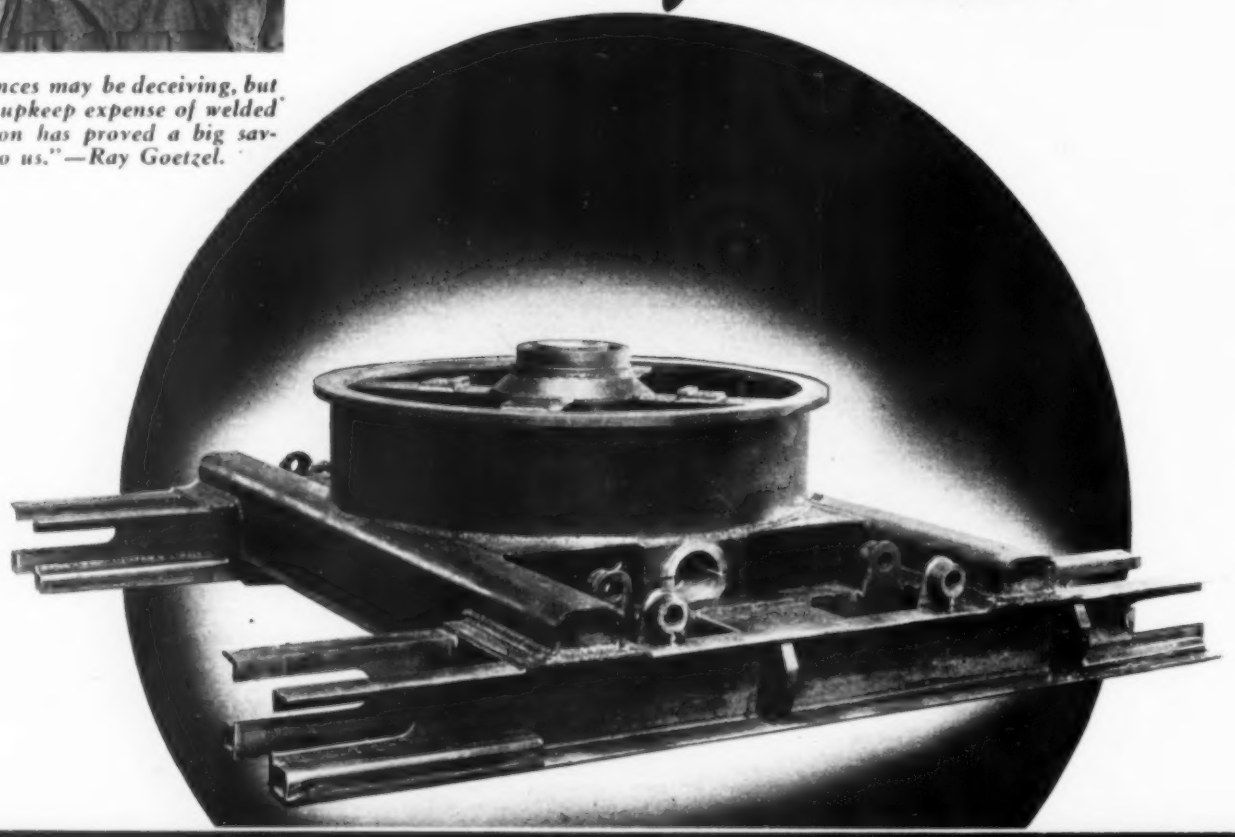
(ABOVE)—*It is significant that where world's records have been set in tunneling operations, "Ventube" has been used! "Ventube" was used on both the Los Angeles water supply project and the Twin Lakes project, where successive world's records were set for speed in tunnel driving.*

DU PONT
VENTUBE

E. I. DU PONT DE NEMOURS & CO., INC.
"FABRIKOID" DIVISION . . . FAIRFIELD, CONN.

"Appearances may be deceiving, but the lower upkeep expense of welded construction has proved a big saving to us."—Ray Goetzel.

Why this WELDED CARBODY *is far better*



P&H Pacemakers-FASTER ON THE JOB

● No bolts — no rivets to work loose or shear. Electric welding of new high tensile steels makes it far lighter — yet actually stronger. The P&H carbody and crawler frames are welded into one rigid unit to insure perfect alignment of driving machinery . . . . to save repair bills. This advanced construction, now being adopted by others, was introduced by the Harnischfeger Corporation.

4494 W. National Ave., Milwaukee, Wis.

Warehouses and Service Stations:
Hoboken, Memphis, Jacksonville, Dallas, Seattle, Los Angeles, San Francisco

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES — P&H SERVICE — HOISTS • MOTORS • ARC WELDERS

Barrett
Tarvia
GOOD ROADS AT LOW COST

THE "Tractionized" surface of a Tarvia road provides lastingly safe traction for high-powered, high-speed automobiles.

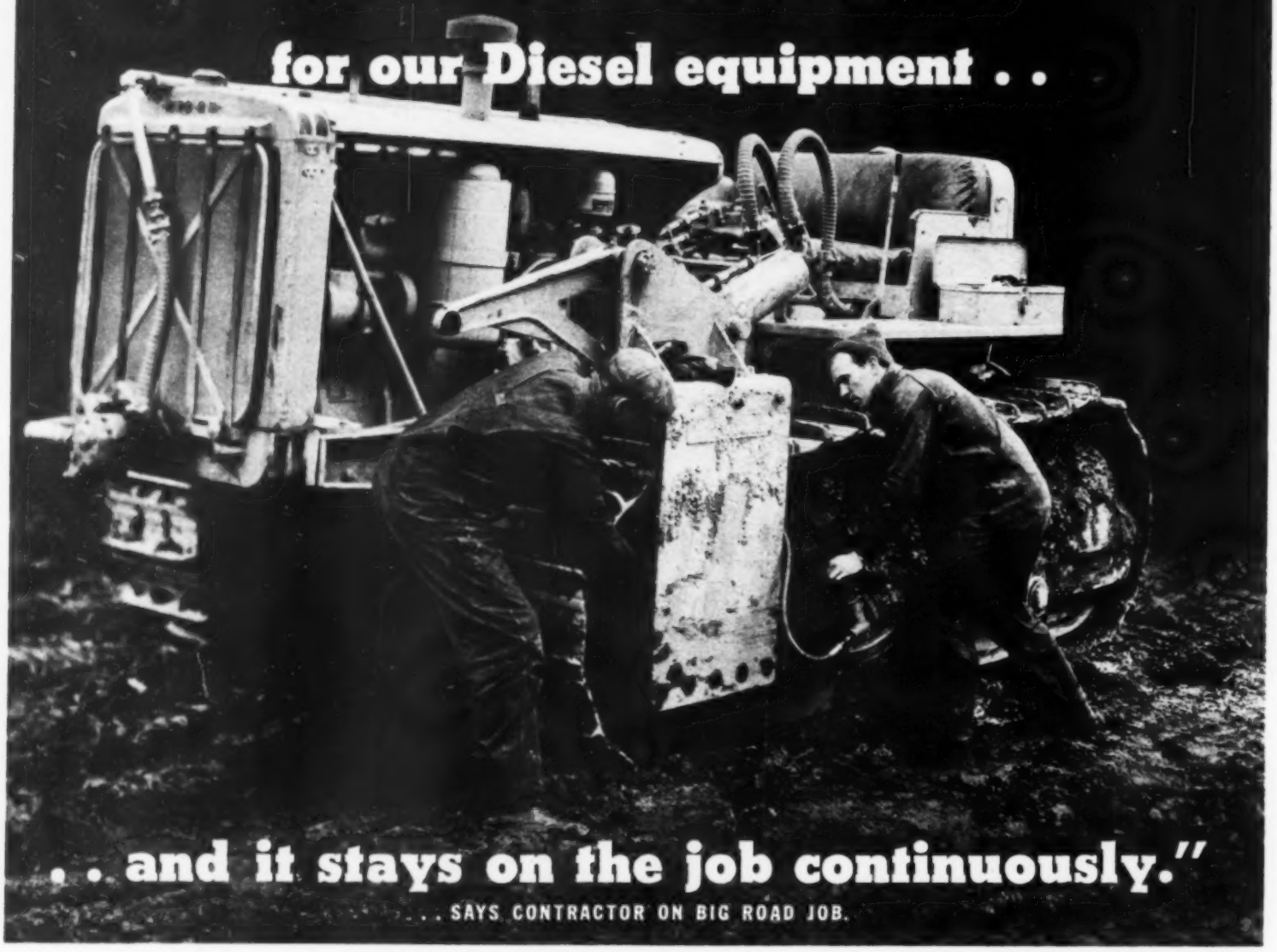
THE BARRETT COMPANY New York Chicago Birmingham St. Louis Detroit Philadelphia Buffalo Lebanon Rochester Baltimore Minneapolis Cleveland Columbus Providence Toledo Youngstown Syracuse Hartford Boston Milwaukee Cincinnati Bethlehem Portland, Me. Norwood, N. Y.

In Canada: THE BARRETT COMPANY, Ltd. Montreal Toronto Winnipeg Vancouver

"We use only

GULF LUBRICANTS

for our Diesel equipment . .



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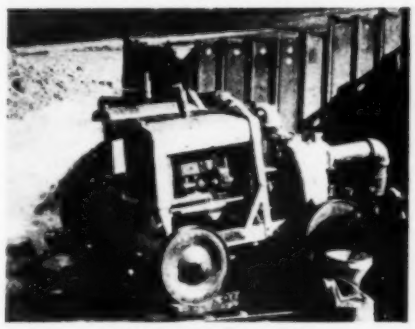
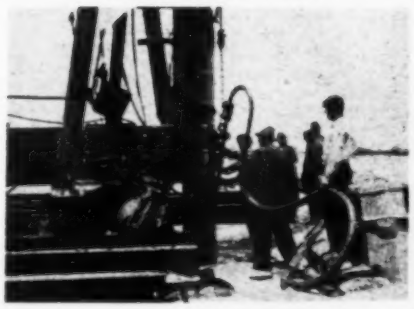
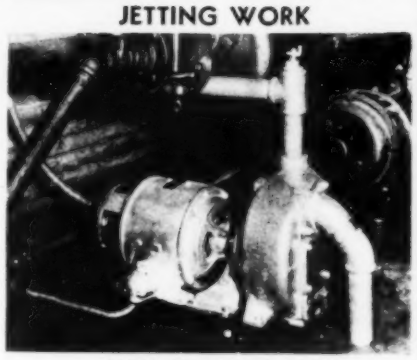


DRAINAGE JOBS



JETTING WORK



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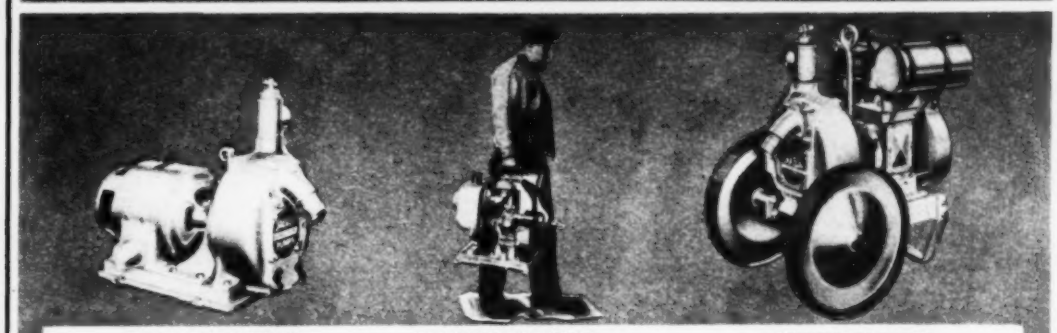

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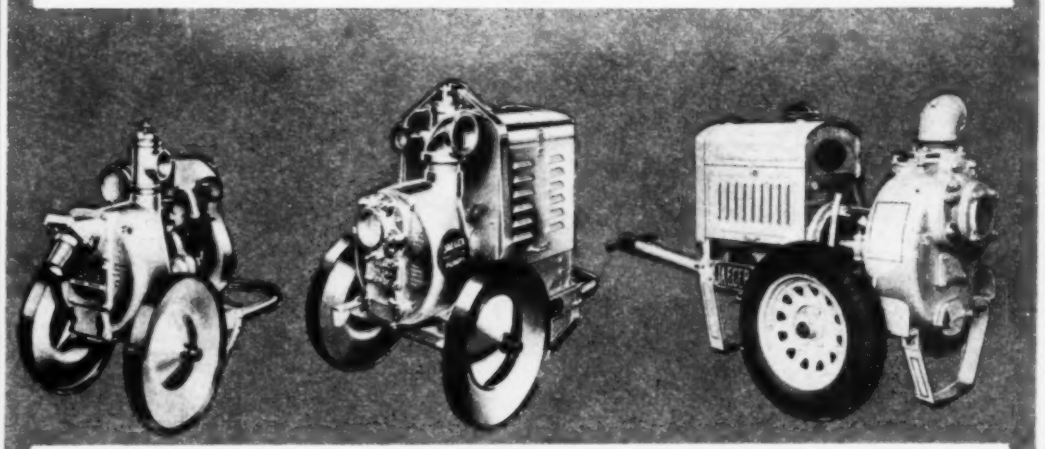

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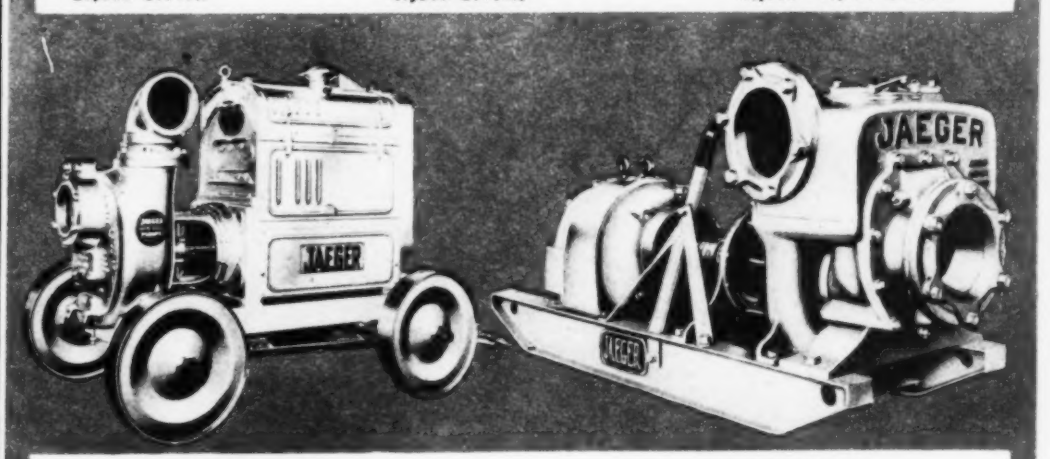
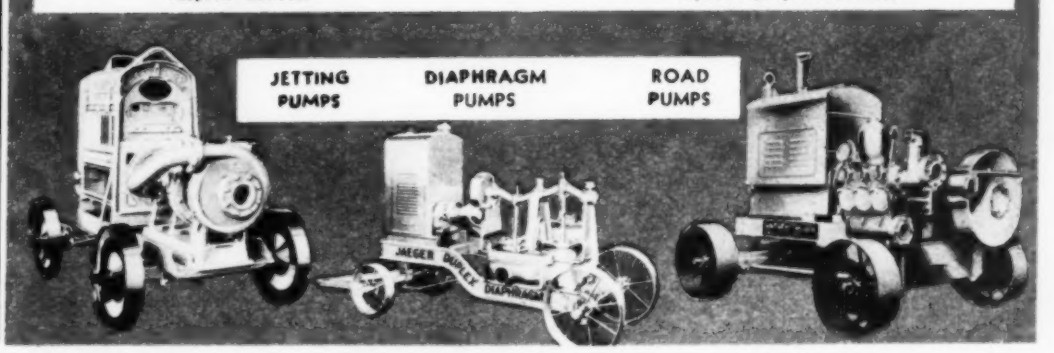


8" HEAVY DUTY 125,000 G.P.H.

10" HEAVY DUTY 175,000—220,000 G.P.H.



JETTING PUMPS

DIAPHRAGM PUMPS

ROAD PUMPS

THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus, O.

A Machine That GOES PLACES DOES THINGS

Here's a camera-eye view of Universal-Lorain truck cranes and shovels in action. Faced with rising construction costs, contractors are finding an ever-increasing number of duties for this versatile unit which turns small, bothersome jobs into sources of profit. General excavation work, steel erecting, materials handling—you will find them everywhere doing everything.

Universal-Lorains don't have to "hitch-hike" their way to a job. Their motor truck mounting enables them to move from one location to another quickly and economically. And they are ready for work the moment they arrive.

Long famous for their efficiency, 1937 Universal-Lorains incorporate the simplified Thew Center Drive design to attain even greater power, speed and strength. They are built in lifting capacities of 6½ to 8½ tons; will handle booms up to 55 ft. long; can be used with ½-yd. clamshell or dragline buckets or equipped with ¾, ½ or ⅜ yd. shipper shaft shovel booms.

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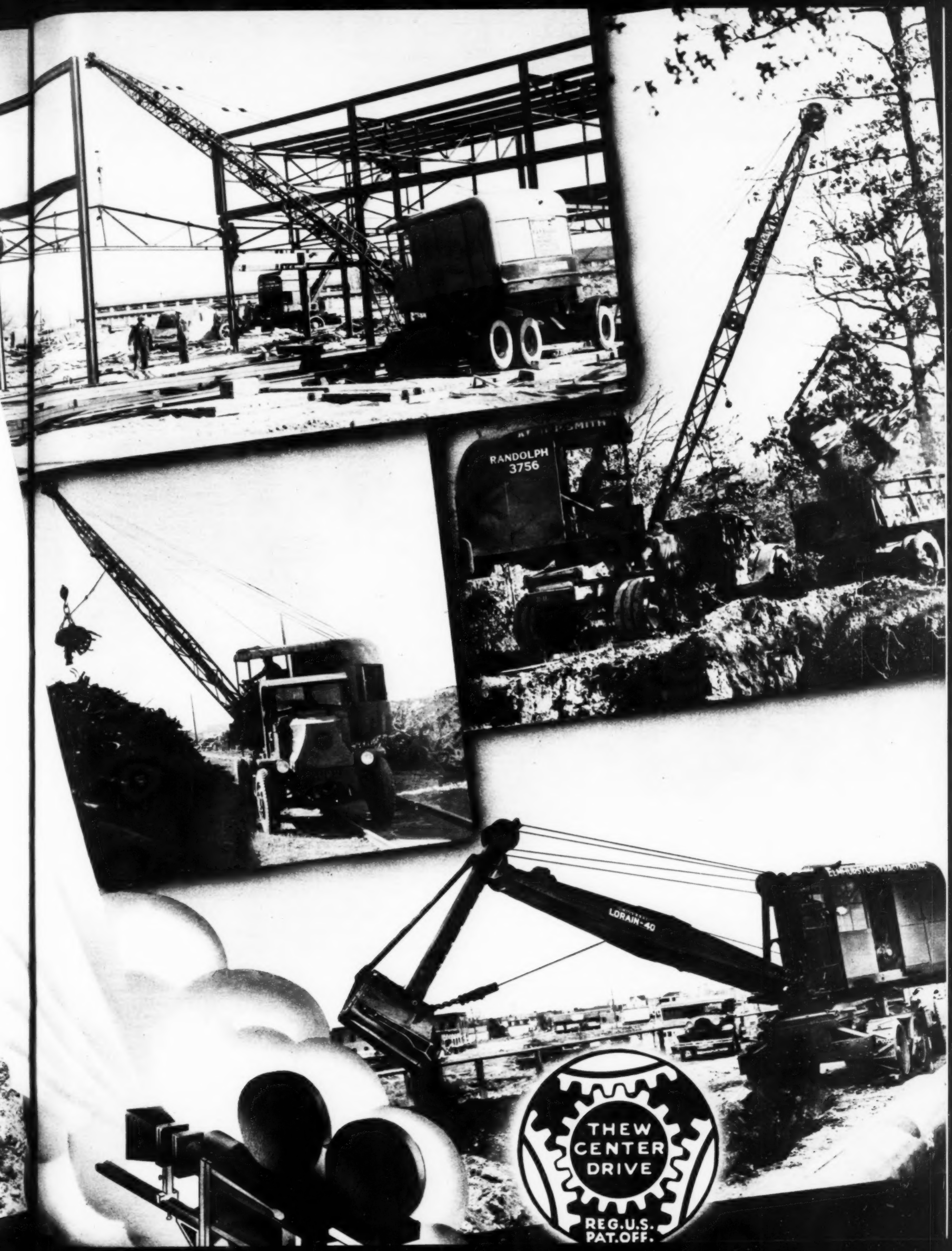
THE UNIVERSAL CRANE CO.

LORAIN, OHIO


RANDOLPH
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THEW
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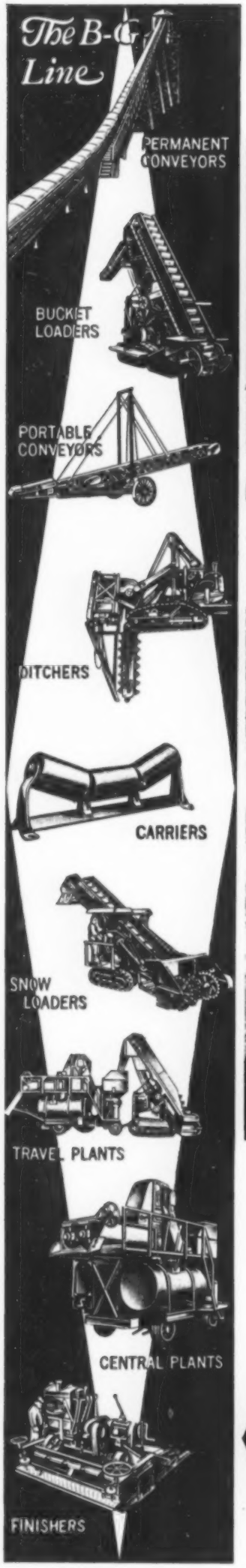
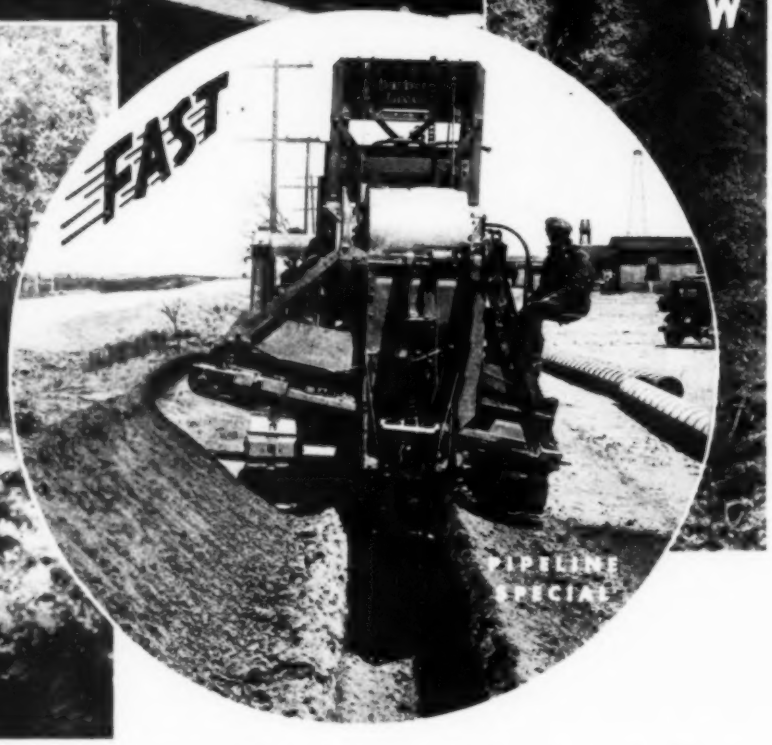
4 Barber-Greenes





The same exclusive basic design applies to all B-G Ditchers. They have demonstrated their milling ability through Florida's coral rock. The self-cleaning buckets have proven themselves in the stickiest gumbo, and the records set by B-G's in the oil fields show dependability and speed that insures profitable ditching.

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All four Barber-Greene Ditchers have the Vertical Boom that digs straight down, the Automatic Overload Release that protects the machine and underground pipe, Self-Cleaning Buckets, Milling Action Digging, and full Crawler Mounted Maneuverability.

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Once in—they're in for good!

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This *permanency* is a big factor in the success and growing popularity of markers made with Atlas White portland cement. When Atlas White markers go in, maintenance worries go out. Repairs are not required. There is no fuss, bother or expense of re-marking.

Atlas White markers never fade out, never wash away. They stay white year after year—clean-cut, easy-to-see guardians of life and limb.

For country highways or city streets. For old or new pavements of any type. Installation can be made in coldest weather. Precast sections, made indoors, are simply moved to the job and set in place. Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), 208 South LaSalle Street, Chicago.

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ATLAS WHITE PORTLAND CEMENT

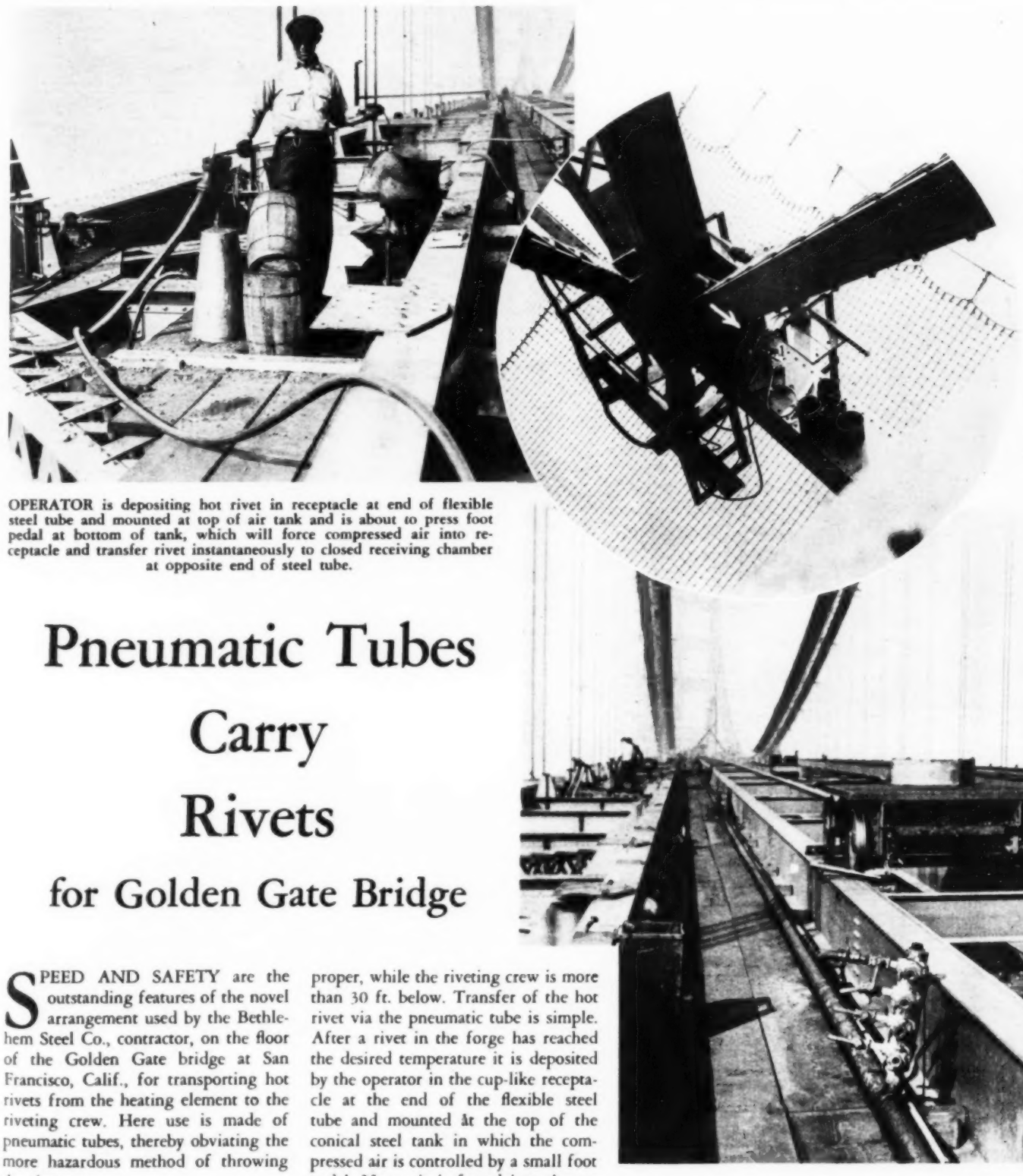
FOR TRAFFIC MARKERS

Construction Methods and Equipment

Established 1919 McGraw-Hill Publishing Company, Inc.

ROBERT K. TOMLIN, Editor

Volume 19 **May, 1937** Number 5



OPERATOR is depositing hot rivet in receptacle at end of flexible steel tube and mounted at top of air tank and is about to press foot pedal at bottom of tank, which will force compressed air into receptacle and transfer rivet instantaneously to closed receiving chamber at opposite end of steel tube.

RIVETING CREW *(left)* at lower truss end protected by safety net. Receiving chamber on pneumatic tube is indicated by arrow.

SMALL HAND-CAR *(below)* operating on steel girders of bridge floor supplies riveting crew with rivets, coke, and other materials.

Pneumatic Tubes Carry Rivets

for Golden Gate Bridge

SPEED AND SAFETY are the outstanding features of the novel arrangement used by the Bethlehem Steel Co., contractor, on the floor of the Golden Gate bridge at San Francisco, Calif., for transporting hot rivets from the heating element to the riveting crew. Here use is made of pneumatic tubes, thereby obviating the more hazardous method of throwing the rivets.

The arrangement has proved advantageous in riveting the lower truss ends of the bridge floor shown in one of the accompanying photographs. On this job the rivets are heated in a manually-operated forge on the bridge floor proper, while the riveting crew is more than 30 ft. below. Transfer of the hot rivet via the pneumatic tube is simple. After a rivet in the forge has reached the desired temperature it is deposited by the operator in the cup-like receptacle at the end of the flexible steel tube and mounted at the top of the conical steel tank in which the compressed air is controlled by a small foot pedal. Next, air is forced into the receptacle by pressing down the pedal at the bottom of the tank, which instantaneously transfers the hot rivet to the inclosed receiving chamber attached to the steel tube at the site where riveting operations are in progress. Here it is finally removed by the operator through a sliding door. Rivets, coke, and other materials are supplied to the operator of the forge by a small car running on the girders traversing the bridge floor.

The bridge is being built by the Golden Gate Bridge and Highway District for which Joseph B. Strauss is chief engineer and Russell G. Cone, resident engineer. A. F. McLane is manager of erection for Bethlehem Steel Co.

This Month's "NEWS REEL"

NEARING COMPLETION

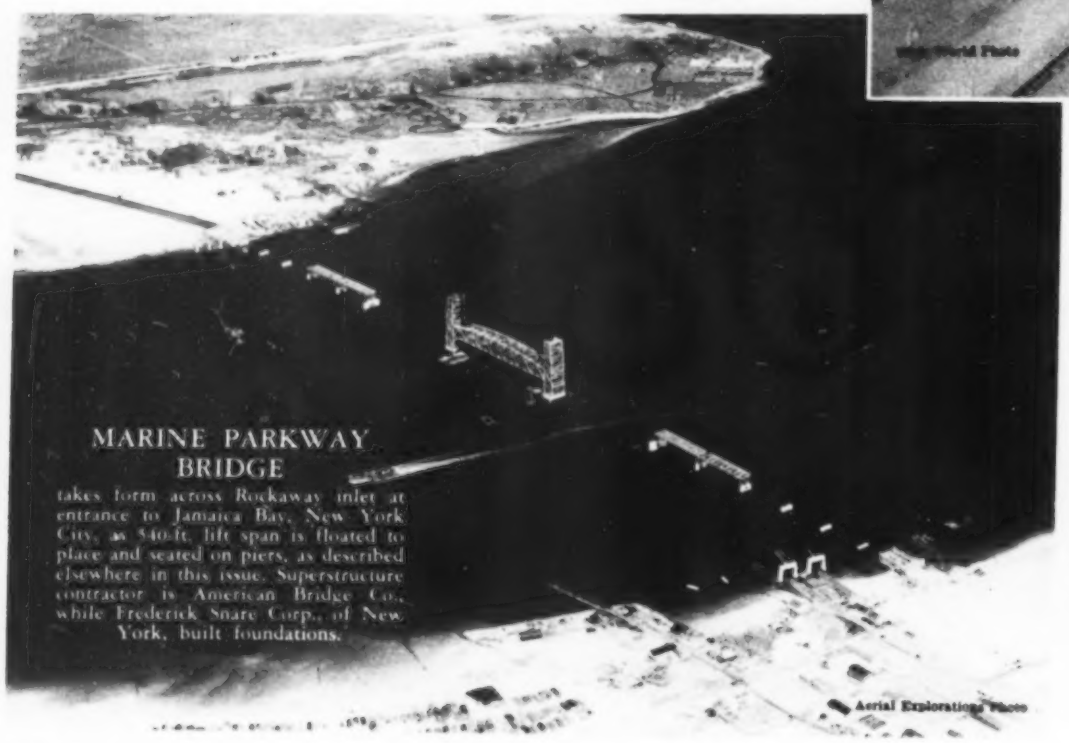
Golden Gate bridge across San Francisco Bay, with its record-breaking cable suspension span of 4,200 ft. supported by towers 700 ft. high, is almost ready to be placed in service. Latest operations on $35,000,000 bond issue structure have involved placing concrete for roadway deck.

MASS HOUSING PROJECT

(right) known as Lockefield Garden apartments, is being completed in Indianapolis, Ind., by N. P. Severin Co., contractor, of Chicago, under bid of $2,440,921, as described in detail elsewhere in this issue. Project in form of "chevron" layout, covering 22 acres, provides living units for 748 negro families. Group of 24 buildings consists of three-story apartments and two-story houses.

MIDTOWN HUDSON TUNNEL

(right), new subaqueous vehicular route between New York and New Jersey, built by Mason & Hanger Co., is almost ready to receive traffic. Inspection of tile lining is made by *(left to right)* ARTHUR S. TUTTLE, N. Y. State engineer for PWA; M. E. GILMOREM, PWA state inspector; T. HAYDEN HAMILTON, of New Jersey; COL. CHARLES S. GLEIM, engineer of construction, Port of New York Authority; and EDWARD STEARNS, PWA project engineer.



MARINE PARKWAY BRIDGE

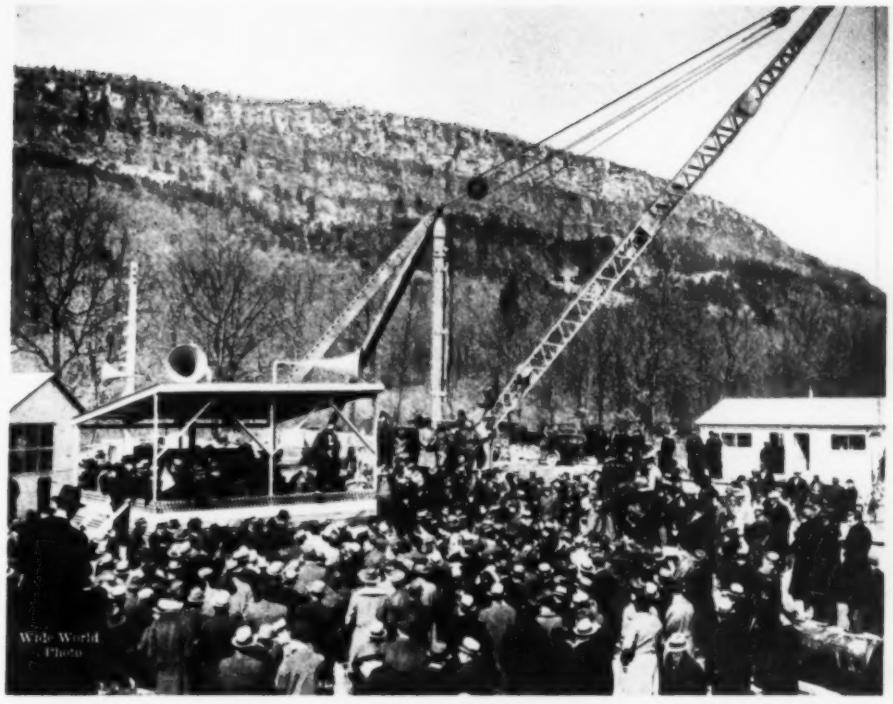
takes form across Rockaway inlet at entrance to Jamaica Bay, New York City, as 540-ft. lift span is floated to place and seated on piers, as described elsewhere in this issue. Superstructure contractor is American Bridge Co., while Frederick Snare Corp., of New York, built foundations.

SEMINOE DAMSITE

(right) on North Platte River in Nebraska is scene of construction activity as Morrison-Knudsen Co., Utah Construction Co. and Winston Bros. prepare foundation for $2,819,459 concrete arch 265 ft. high for U. S. Bureau of Reclamation. Work on diversion tunnels is virtually completed. View shows start of work on tailrace.

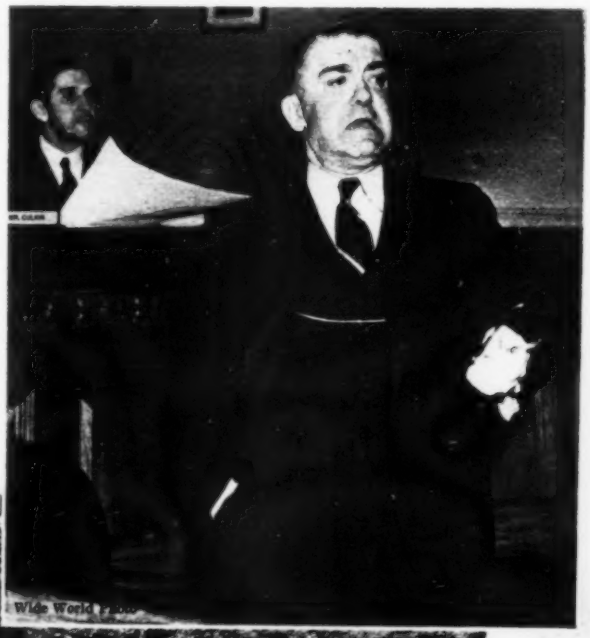
FAVORS FLORIDA CANAL

(below) MAJOR-GENERAL EDWARD M. MARKHAM, Chief of Engineers, U. S. Army, appears before House Committee on Rivers and Harbors in Washington, D. C., as witness advocating resumption of construction of trans-Florida waterway, on which work was suspended last year, at estimated cost of approximately $198,000,000.



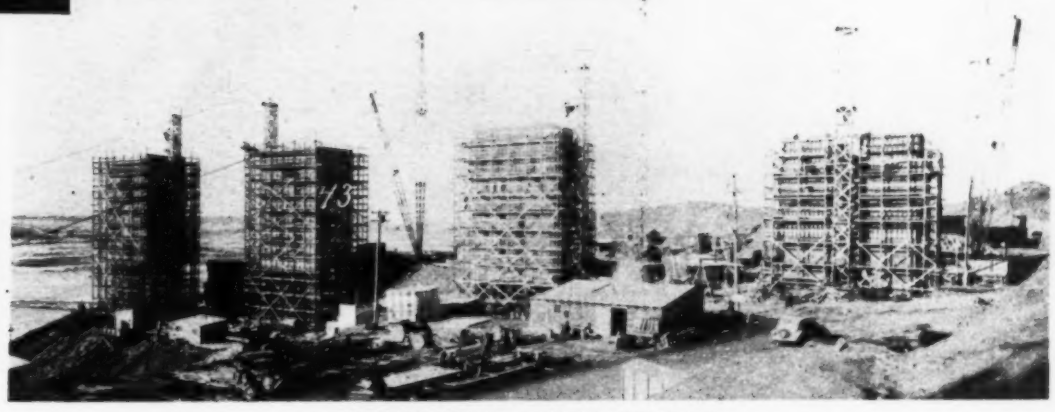
FIRST SHAFT SINKING

operations for New York City's additional water supply from Delaware River are undertaken with ceremonies March 24 by Dravo Contracting Co., of Pittsburgh, at Gardiner, N. Y., when Mayor La Guardia set off first blast at shaft 3 of $270,000,000 project involving 85-mi. of aqueduct tunnel. Project is under supervision of WALTER E. SPEAR, chief engineer, N. Y. Board of Water Supply.



ACCIDENT PREVENTION AWARDS

are made to Detroit members of Associated General Contractors of America. *(at left)* L. P. RICHARDSON, president of General Builders' Association of Detroit, presents A. E. Horst cup to A. H. ALDINGER, of WALBRIDGE-ALDINGER CO., for excellence of individual company safety record. *(above)*, RALPH A. MACMULLAN, secretary of General Builders' Association of Detroit, hands W. F. Austin cup to H. E. CLAFEHN, of A. A. ALBRECHT CO., chairman of Accident Prevention Committee, in recognition of Detroit association's low accident record last year.



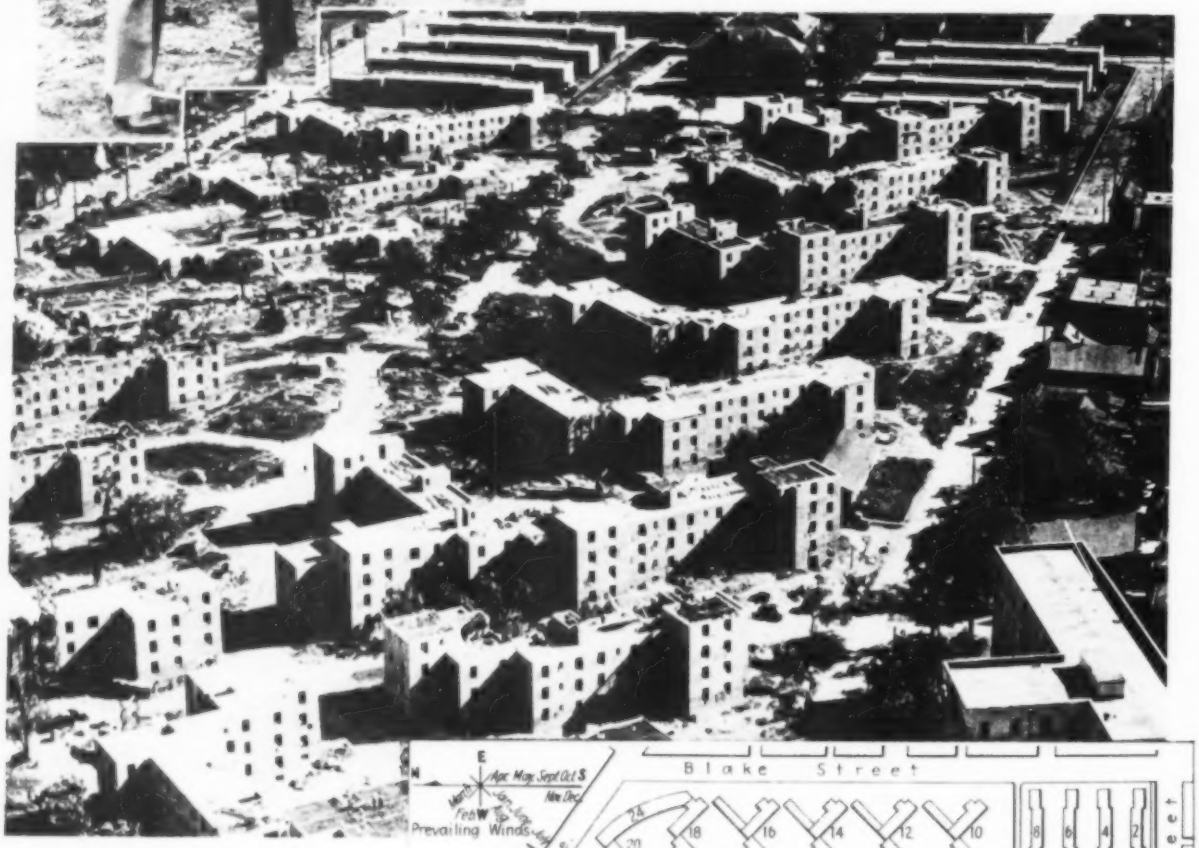
EMERGENCY GATE SHAFTS

rise at site of Fort Peck dam on Missouri River in Montana as Lovering-Longbotham Co., of St. Paul, Minn., subcontractors for Bartlett-Hayward division of Koppers Co., places concrete to house machinery in structures rising to elevation of top of dam, when completed.

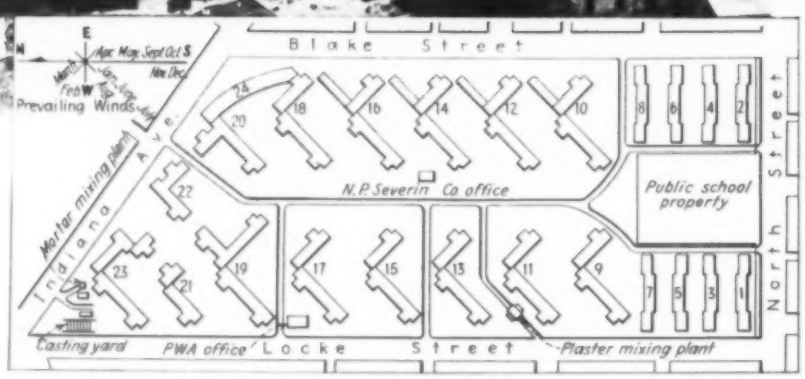
DESIGN AND CONSTRUCTION are individual responsibilities of MERRITT HARRISON *(left)*, of Russ & Harrison, architects; R. M. CURTIS, superintendent, the N. P. Severin Co.; and W. J. WEESNER, project manager, PWA Housing Division.

Systematic Layout and Procedure

Mark Construction of Indianapolis Mass Housing



PROGRESSIVE CONSTRUCTION of 24 buildings in orderly sequence places them on this typical day in all stages of completion from first floor wall laying in one unit to final interior finish in another.



CONSTRUCTION LAYOUT at Lockefield Garden Apartments, PWA housing project in Indianapolis, indicates principal temporary hauling roads and locations of central plaster and mortar plants. Buildings covering 22 per cent of 22-acre plot are laid out to gain year-round sunlight and cooling breezes in summer. Units 1 to 8 are solid row two-story dwellings. Remainder are three-story apartment houses, except No. 24, which provides space for twelve stores.

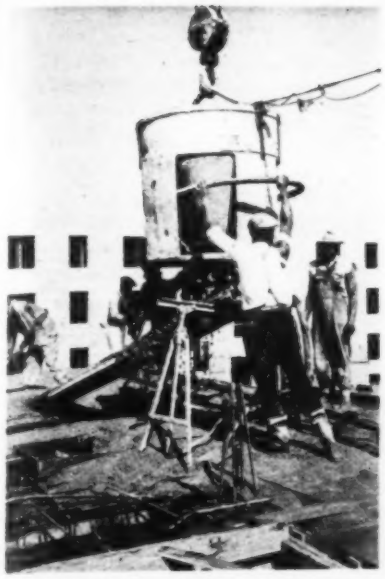
ORGANIZED by the general contractor, the N. P. Severin Co., of Chicago, for an orderly sequence of repetitive operations on 24 buildings comprising Lockefield Garden Apartments, PWA housing project in Indianapolis, Ind., construction of the group has proceeded steadily and systematically toward completion. Covering 22 per cent of a total plot area of 22 acres and providing living units for 748 negro families, the buildings require a large quantity of materials, as indicated by the partial list given in an accompanying table. The work was laid out by the general contractor to reduce material handling to a minimum and to permit a large number of subcontractors and building trades to carry on their progressive functions in good order and without interference.

Group Plan — An accompanying drawing shows the "chevron" layout of the group of buildings, designed to assure maximum sunlight throughout the 12 months of the year and to obtain the maximum benefit of cooling breezes during the hot summer months. The ground around the buildings is landscaped and planted, and ample space is left for playgrounds and recreation areas.

Building Design — Aside from the general planning features of layout and room arrangement, the design of the buildings provides concrete footings and foundation walls up to grade, supporting load-bearing masonry walls into which are framed reinforced concrete girders and slabs of the various floors and roofs. The girders span various distances from 11 ft. to 14 ft. 10 in. between column centers. Exterior walls are faced with brick laid up in rusticated pattern in a wide range of tones and shades. In all, the project calls for ten blends of brick and ten distinct shades. The buildings are equipped with metal windows and are of fireproof construction throughout.

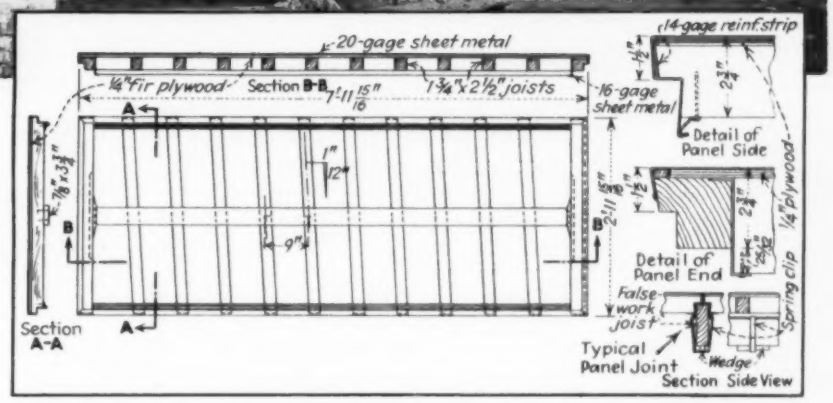
The contractor was required to use Haydite blocks instead of hollow tile as the backup in the exterior walls. The masonry walls ordinarily are 1 ft. 2½ in. thick at the base of solid brick up to an offset at the top of a belt course at the first floor window sill height, where Haydite backup begins and the thickness reduces to 1 ft. ½ in. In certain buildings (the so-called T-units) the wall thickness above the

FOUNDATION CONCRETING goes forward with aid of mobile paving mixer and wooden panel forms.



LIGHT PORTABLE CHUTE carries concrete to points beyond reach of crane.

FLOOR CONCRETE, produced by paving mixer from dry batches delivered by truck, is hoisted in bottom-dump bucket on load line of crawler crane.



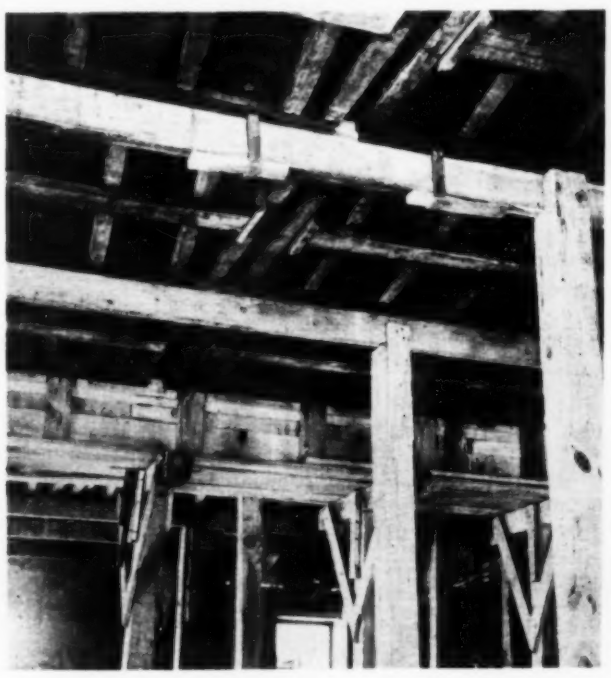
METAL-FACED PANEL FORM *(right)* backed by plywood filler and wood frame serves repeated uses in building concrete slab floors of housing project. Unit forming 24 sq.ft. of slab weighs 100 lb. — can be handled by one man.

foundations is 1 ft. 4½ in. of solid brick, which reduces 2 in. at the first floor window sill offset, where Haydite backup begins, and another 2 in. at the second floor window sill offset. Concrete floor slabs are normally 6 in. thick and are built with gravel concrete required to develop a strength of 2,000 lb. per square inch in 28 days. For some of the short spans, 5-in. slab is used.

All the large buildings in the project are three stories high. Eight lines of solid row houses at the south end of the plot are two stories high. The concrete roof slabs of all the buildings are covered with 20-year bonded built-up gravel roofing, applied on top of 1½-in. fiber board insulation. Decoration inside the buildings calls for painted concrete ceilings and colored sand-finish plastered walls. Types of finished flooring include hardwood, tile, terrazzo, linoleum and fire clay.

SECTIONAL FORMS for columns and beams, lined with tempered composition board on exposed concrete surfaces, are erected and shored in usual way.

WALL OFFSETS at first and second floor window sill belt courses reduce thickness 2 in. at each level.



UNDERSIDE OF SLAB FORMS *(right)* reveals plywood filler and timber framing of metal-faced panels supported on shore joists to which panels are locked by wedges driven into spring clips.

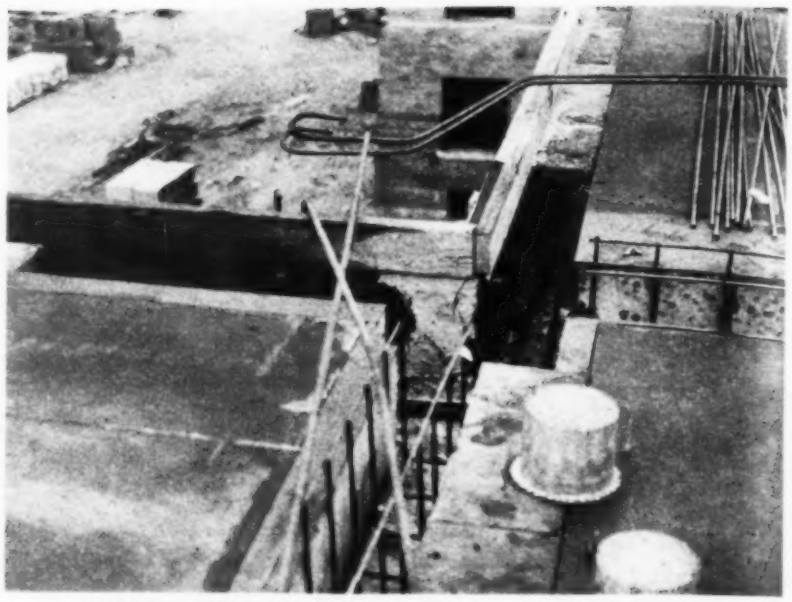
Maple, birch and beech are used in the hardwood floors.

Construction Layout — A mobile paving mixer supplied with dry batches by trucks produced 30,000 cu.yd. of concrete required for foundations and superstructures. Central mixing plants for mortar and plaster were set up inside the area, as indicated on the plan. This drawing also shows the principal construction roads and the location of a casting yard for Haydite lintels. As the lintels were of special shapes and sizes, it was cheaper to cast them on the job than to order them from a commercial plant.

Foundations — Following demolition of 253 negro slum houses and eradication of about 50,000 rats, foundation excavation uncovered old basements, wells and cisterns which had been backfilled. Through the center of the project ran what apparently had been the bed of a creek. Footing designs had been made originally for clay-gravel bearings based on test borings. Going to greater depths through the backfilled depressions, the contractor in places encountered other materials which required considerable changes in footing design and involved some delays. Depending upon conditions, the footings were constructed with reinforced concrete designed to develop either 2,000 or 3,000 lb. per square inch in 28 days. Except for the 3,000-lb. concrete used in some of the footings, all the rest of the concrete in the project was designed for a compressive strength of 2,000 lb. per square inch.

Floor Slabs — Concrete floor slabs

and roof slabs were placed at successive levels as the masonry walls went up. Forms for the flat slabs consisted of 3x8-ft. metal-faced panels reinforced with plywood backing and stiffened by an attached framing of wood joists. Joints between panels were filled with a putty-and-grease paste, practically eliminating all fins and leaving a smooth ceiling surface for the painters. Each unit of floor slab required 85 to 110 cu.yd. of concrete, which was placed in an average time of 5 hr. A 1-cu.yd. paving mixer produced a batch on an average of slightly more than 2 min., and a long boom crane hoisted the mixed batches in a bottom-dump bucket from the mixer to the point of placement. The paver-crane combination was able to place 28 yd. an hour, and the contractor tried to complete two concrete slab units in one day. To maintain steady progress in slab concreting, the job was equipped with seven full sets of panel forms. Concrete in slabs and beams was vibrated with a flexible-shaft high-frequency internal vibrator.

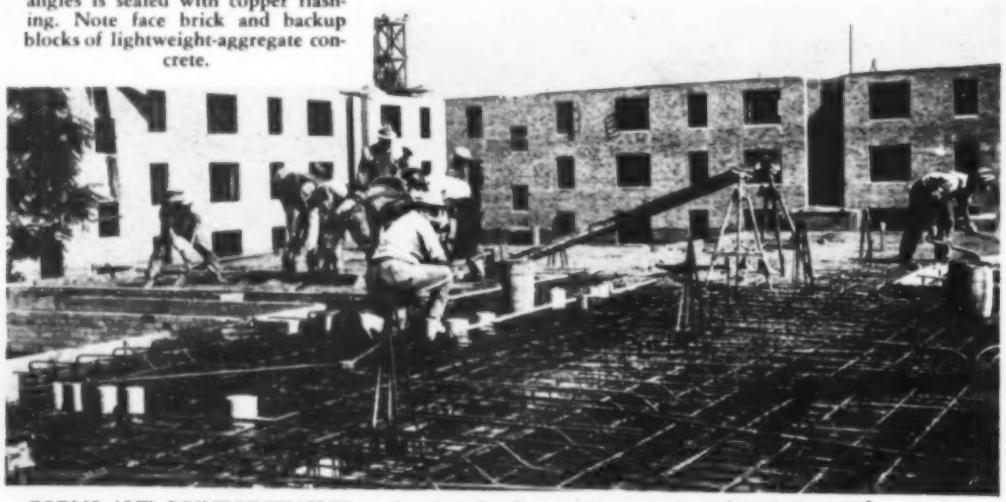


CONCRETE BEAMS of this floor will tie into masonry load-bearing wall at 90-deg. angle in building. Filler section of slab form between metal-faced panel and beam side consists of tempered composition lining on ⅞-in. board. Pipe inserts are filled with sand.

PLASTER MIXING PLANT utilizes old basement to form depressed roadway for trucks loading from hopper into which two mixers dump.

FROM CENTRAL PLANTS end-dump trucks deliver plaster and mortar to all points on job.

EXPANSION JOINT 2 in. wide between two walls set at right angles is sealed with copper flashing. Note face brick and backup blocks of lightweight-aggregate concrete.



FORMS AND REINFORCEMENT are in place for floor slab concreting advancing toward foreground from area in rear. Note pipe inserts tacked to slab forms.

Panel Forms — Invented by A. G. Wedberg, of Stockholm, Sweden, and controlled in this country by Mr. Wedberg's representative, Bernard R. Klekamp, architect, of Chicago, the wood-reinforced steel-panel forms, known as Meta-Wood forms, were furnished, installed and removed by Borg & Johanson, of Chicago, a subcontractor, under a lump-sum contract. At Lockefield Garden Apartments the forms were used about 15 times.

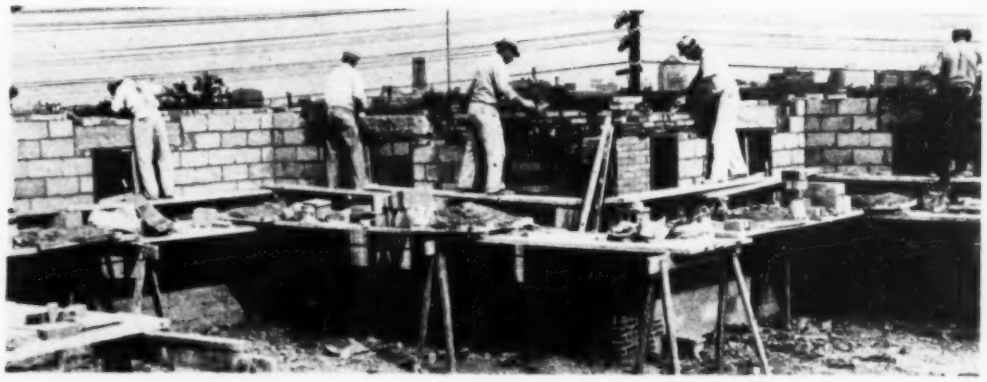
Details of the panel form construction are indicated by an accompanying drawing. The metal surface of the panel consists of cold-rolled stretcher level rubbed steel sheet (with all buckles taken out and all scale rubbed off) corresponding to automobile body stock. This sheet steel comes from the mill with a coat of oil on it. The edges of the panel are formed by dies in power presses. Plywood filler is used on the underside of the steel sheet to prevent denting of the metal surface and to offer a holding medium for tacking down pipe inserts. When the inserts are removed, oil fills the holes on the next use of the form.

A 3x8-ft. panel weighs 100 lb. and can be handled by one man. Under the plywood backing of the form surface are a number of 1¾x2½-in. joists (shown in the drawing) which are set on a slight diagonal and are tapped to a driving fit in the clip flange of the long edge of the panel. This timber framework stiffens the reinforced panel against any distortion. An additional 14-gage steel reinforcing strip is included along the two sides of the panel, as indicated by the detail of panel side. The panel is completely fabricated at the factory, and all wood members are dipped in creosote. Wetting causes no change in panel size. The units are designed to withstand a pressure of 250 lb. per square foot without deflection.

Ordinary joists and shores were

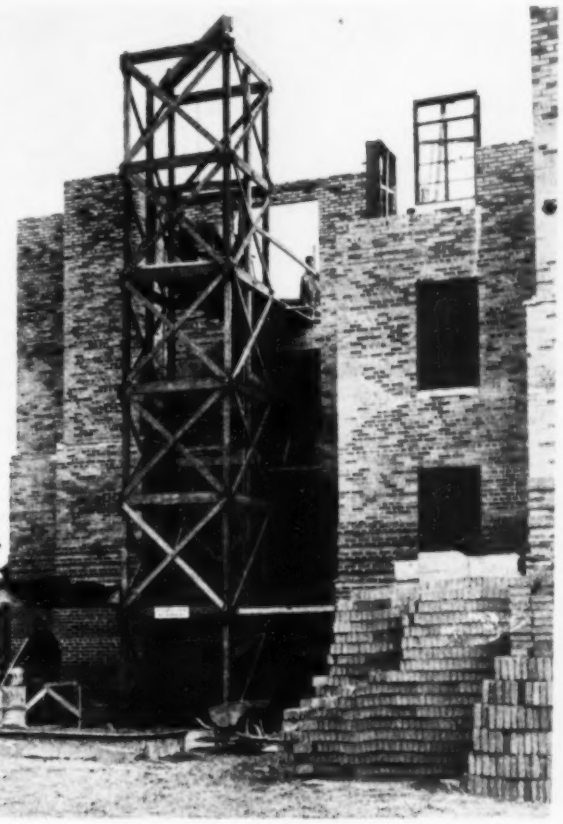
HOMEMADE TABLE SAW built by one of Leon Joyce's men utilizes carborundum disk direct-connected to 1-hp., 3,500-r.p.m., a.c. motor to cut special lengths of glazed tile for stairwells.

STEEL PLATE replaces steel channel at one side of stairs because punching and shearing of plate in shop is easier and cheaper than sawing required for channel.



MASONS on horse scaffold lay up face brick and lightweight backup block against background of Indianapolis skyline.

RUBBER TIRES make pushing easier, whether they are mounted on stone truck, as above, concrete cart or water keg.



used under the panel forms. The method of making a typical joint between two panels is shown in the drawing. Clips for making these joints were furnished with the panels, and the carpenters on the job cut the wedges to drive the clips tight against the bottom of the joists. To fill out the gaps adjacent to walls and beams at Lockefield Garden Apartments, the contractor used fillers of $\frac{7}{8}$-in. board faced with tempered composition lining. Pipe inserts were nailed to the panel forms and filled with sand. To provide ceiling openings for electrical conduit which turned down in an unconventional manner, holes were drilled in certain form panels, and these panels were re-used in the same position in other buildings. Beam and column forms were lined with tempered composition board.

Direction—A total appropriation of $3,025,000 was made by the Housing Division of the Public Works Administration for the Lockefield Garden Apartments. The general contract of N. P. Severin Co. was awarded on a lump sum bid of $2,440,921, covering practically all work except landscaping.

STEEL WINDOW FRAMES erected in advance of wall construction are anchored in plumb position by turnbuckle wire ties attached to pins in masonry joints.

FACE BRICK *(above)* in ten blends and ten distinct shades is laid up in rusticated pattern. Twelve timber towers deliver mason materials to upper floors.

Personnel — The architects for the project were William Earl Russ and Merritt Harrison, of Indianapolis; mechanical engineers, Bevington & Williams, Inc., Indianapolis; landscape architect, Lawrence V. Sheridan, Indianapolis; landscape contractor, W. A. Natorp Co., Cincinnati.

The project is being carried to completion under the direction of the following representatives of the Government: Carl Ferguson, district manager for the Housing Division of PWA, and W. J. Weesner, project manager. N. H. Hill is project engineer and J. F. Quinn, project accountant.

For the N. P. Severin Co., general contractor, of Chicago, R. M. Curtis is superintendent in charge of construction at the site.

Landscape work for the W. A. Natorp Co. is under the direction of E. A. Smith, superintendent.

Major Construction Quantities . . . Lockefield Garden Apartments, Indianapolis

	Approx. Quantity	
Portland cement (standard gray)	44,000	bbl.
Mason cement — optional	14,500	"
Non-staining cement	150	"
Crushed stone } optional	25,000	tons
Gravel } optional	32,000	"
Gravel roofing	350	"
Sand—concrete, mason & plaster	38,000	"
Lightweight concrete aggregate	500	"
Face brick	3,500,000	pcs.
Face brick—bullnose	500	"
Common brick	1,600,000	"
Haydite backup tile		
4-in. backup	22,500	sq.ft.
8-in. backup	280,000	" "
12-in. backup	20,000	" "
Haydite window sill tile	22,000	lin.ft.
Haydite wall top filler tile	44,000	" "
Partition tile		
3x12x12-in. — scored	305,000	pcs.
4x12x12-in. — scored	49,000	"
4x12x12-in. — smooth	18,000	"
6x12x12-in. — scored	5,000	"
6x12x12-in. — smooth	3,000	"
8x12x12-in. — smooth	3,000	"
2x5x12-in. — glazed one face	70,000	"
4x5x12-in. — glazed one face	22,000	"
6x5x12-in. — glazed one face	200,000	pcs.
6x5x12-in. — glazed two faces	7,000	"
Flue lining 18x18 in.	3,500	lin.ft.
Gypsum plaster	4,500	tons
Plasterers' quick lime	1,100	"
Pulverized quick lime	440	"
Radial granite curb	190	lin.ft.
Bituminous expansion joint 1x4 in.	4,500	" "
Bituminous expansion joint ½x7 in.	2,400	" "
Lightweight nailing brick	36,000	pcs.
Reinf. steel	1,000	tons
Excavation	45,000	cu.yd.
Sidewalks	86,000	sq.ft.
Driveways	20,000	" "
Forms	1,100,000	" "
Concrete	30,000	cu.yd.
Cement finish	750,000	sq.ft.
Limestone	22,000	cu.ft.
Wood block flooring	400,000	sq.ft.
Glass	44,000	pcs.
Windows	4,000	"
Doors	4,500	"
Mail boxes	658	"
Kitchen cabinets	748	"
Door bucks	5,100	"
Metal doors	1,000	"
Incinerators	73	"
Lintels	4,112	"
Thresholds	3,710	"

Prompt Equipment Maintenance

Aids Machine Performance on Road Construction Job

HYDRAULICALLY CONTROLLED BULLDOZER on 76-hp. tractor grades ramp leading into deep cut.

CUT 22 FT. DEEP on center line is excavated by 1¼-yd. shovel loading material into 7-yd. truck. Temporary road on bank at right carries highway traffic to connection with existing route.

CONTRACTOR AND ENGINEER *(at left)* — John Iafolla (left) is president of John Iafolla Construction Co., and F. T. Denison is engineer for the New Hampshire State Highway Department.

CAREFUL ATTENTION to every detail of plant upkeep, characterized by installation on the job of portable equipment for machine maintenance, assisted the John Iafolla Construction Co., of Dedham, Mass., contractor, in making steady progress last summer on a contract for the New Hampshire State Highway Department, involving about 3 mi. of bituminous surface-treated gravel road on U. S. 3 west of Twin Mountain. Three power shovels excavated earth and rock for the roadway grade and gravel at the site of a crushing and screening plant for the base and surface of the road section. A fleet of ten 7-cu.yd. (water level) trucks hauled excavated material from the shovels an average distance of about 800 ft. into the fills, where tractor-bulldozers spread the dumped loads. All the equipment was maintained in first-class working condition by trained mechanics on the job.

Surface Treated Gravel — Bituminous surface-treated gravel roads incorporating a heavy gravel base and resting on well-drained subgrade have given efficient and economical service in the White Mountain region, where this project was built. Depending upon foundation conditions, the specifications for the project called for gravel base 11, 17 or 23 in. thick. Fully half of the job, which had an exact length of 14,376 ft., was relocation of the existing route, and soil soundings at one place on the new location showed about 10 ft. of muck. This soft material was displaced by loading with sand and gravel excavated from cuts.

Within the length of the improvement are four curves ranging from 15

ROTARY SCREEN *(right)* above overhead bin separates crushed material delivered to it by belt conveyor from jaw crusher.

min. to 4 deg., with a 6-deg. curve connecting the improved road at its east end with the existing road. A maximum grade of 8 per cent occurs in the deepest cut on the project, which has a depth of 22 ft. on the center line and 30 ft. to the top of slope on the high side.

A treated gravel roadway surface 24 ft. wide and 4 in. deep was given two applications of hot tar, a primary application of 0.3 gal., followed by a scattering of sand, and a second application of 0.2 gal., followed by sanding and dragging with a multiple-blade maintainer. Shoulders are 2 ft. wide on fills and 5 ft. wide in cuts, the shoulders in the latter locations being made wider principally to take care of snow. Quantities involved in the contract are indicated by an accompanying table.

Equipment Maintenance — In addition to ordinary blacksmith shop equipment, the contractor placed on the job a truck-mounted welding generator which also supplied current for operating electric tools. The same truck carried oxygen and acetylene tanks for flame cutting. On the front end of a light pick-up truck was mounted a small compressor for inflating tires

AT GRAVEL PLANT bank-run material is loaded into light end-dump truck by gasoline shovel.

TRUCKS BACK 600 FT. from shovel to build fill across muck hole by end-dumping.

TRACK TREADS *(right)* wrapped around dual pneumatic-tired wheels on two rear axles of motor grader give additional traction in soft crushed bank-run material.

IN CHARGE OF WORK *(at right)* — George Nolfi (left) general superintendent for John Iafolla Construction Co.; D. A. Proctor, resident engineer for New Hampshire State Highway Department; and Frank Iafolla, superintendent for contractor.

to be moved to build the roadway grade. Cuts and fills balanced for 10,000 ft. at the east end of the project, but about 2,000 cu.yd. of borrow was used on the west end. On the fills dumped loads of material were spread and compacted by a 76-hp. gasoline tractor carrying an hydraulic bulldozer.

It will be noted from the accompanying table of contract quantities and prices that the successful bidder put a price of only 1c. per cubic yard on an estimated quantity of almost 6,500 cu.yd. of earth borrow. The contractor bid this low price because he judged that only a small portion of the estimated borrow would be required. Actually, less than 2,000 yd. of borrow was needed to complete the contract.

anywhere on the job. Various uses of the maintenance equipment are indicated by accompanying photographs. Mechanics were able to make all ordinary repairs and machinery changes with tools and equipment available on the project.

Grading — Two 1¼-yd. gasoline shovels loaded 55,000 cu.yd. of earth and 10,000 cu.yd. of rock which had

Gravel Base and Surfacing—Crushed 3-in. material for the base course and 2-in. material for the top course were hauled by 7-yd. trucks from overhead bins at the crushing and screening plant. The trucks distributed the material in layers not exceeding 5 in. in depth by end-gate dumping while in

motion. A motor patrol grader spread the crushed gravel on the roadway, where it was sprinkled by tank trucks and compacted by a three-wheel, 10-ton roller. Hot tar was applied by pressure distributor in the usual manner. Shoulders were shaped by a 50-hp. gasoline tractor-bulldozer.

Gravel Plant — A crushing and screening plant to produce concrete aggregate and roadway material was set up at a gravel pit near the east end of the project. At this plant a 1-yd. gasoline shovel loaded gravel into light end-dump trucks which backed up a ramp to deposit their loads in a hopper feeding a 12x24-in. jaw crusher driven by belt from a 75-hp. gasoline engine. A 24-in. belt conveyor, measuring 62½ ft. in length between pulley centers, carried crushed material from under the crusher to a 5-ft.x48-in. rotary screen mounted above 25-yd. overhead bins under which the 7-yd. hauling trucks were loaded. After producing about 400 cu.yd. of crushed gravel aggregate for concrete, the plant began to put out material for the roadway. Its capacity, when producing the latter material, was about 450 cu.yd. in 13 hr.

Administration — Frederic E. Everett is commissioner of the New Hampshire State Highway Department, and C. P. Riford is construction engineer. Operations on the project were directed for the highway department by D. A. Proctor, resident engineer, and F. T. Denison, engineer. For the John Iafolla Construction Co., headed by John Iafolla, construction was supervised by George Nolfi, general superintendent, and Frank Iafolla, superintendent on the job.

Contract Quantities and Prices

Item	Unit	Quantity	Unit Price	Amount
Clearing and grubbing	acre	13.93	75.00	1,044.75
Fine grading	lin. ft.	14,376	.10	1,437.60
Earth excavation	cu. yd.	55,967	.50	27,983.50
Ledge excavation	cu. yd.	10,343	.50	5,171.50
Earth borrow	cu. yd.	6,429	.01	64.29
Gravel sub-base course	cu. yd.	18,391	.45	8,275.95
Gravel base course	cu. yd.	1,613	.45	725.85
Crushed grav. surf. course	cu. yd.	4,334	1.50	6,501.00
Furn. & apply bit. sur. treat. type A-1	gal.	23,422	.135	3,161.97
Drop inlets type B	each	5	50.00	250.00
Wood post markers	each	50	1.25	62.50
Cable rail wood posts	lin. ft.	6,676	.35	2,336.60
Anchor for cable rail	each	48	8.00	384.00
Wood guard railing	lin. ft.	408	.35	142.80
Loam 2 in. deep.	sq. yd.	4,000	.10	400.00
Reinforcing steel	lb.	9,971	.05	498.55
Class A concrete	cu. yd.	60	16.00	960.00
Class C concrete	cu. yd.	46	16.00	736.00
Class D concrete	cu. yd.	69	16.00	1,104.00
Furn. & lay 15-in. r.c. pipe	lin. ft.	236	1.25	295.00
Furn. & lay 18-in. r.c. pipe	lin. ft.	616	1.75	1,078.00
Furn. & lay 24-in. r.c. pipe	lin. ft.	184	2.60	478.40
Furn. & lay 30-in. r.c. pipe	lin. ft.	156	4.00	624.00
Bit. coat. perf. corr. met. pipe undr.A 6 in.	lin. ft.	4,227	.90	3,804.30
Removing surf. treatment	sq. yd.	3,124	.10	312.40
Cobble gutter	sq. yd.	432	1.50	648.00
			Total	$68,480.96

Portable power units facilitate machine maintenance on New Hampshire road job

SMALL COMPRESSOR connected to crank shaft at front end of pick-up truck inflates tires anywhere on job. Compressor develops 180-lb. pressure. Cap in front of compressor can be removed to permit hand cranking of truck motor, if desired.

TRUCK-MOUNTED WELDING GENERATOR supplies current for electric power tools, as well as for welding. Truck also carries tanks of oxygen and acetylene. Behind truck is blacksmith shop equipped with forge and anvil.

ELECTRIC WELDING is utilized to make angle brackets for use in power shovel.

OXY-ACETYLENE TORCH cuts spacing ring for power takeoff on truck. Ring has been laid out on steel plate.

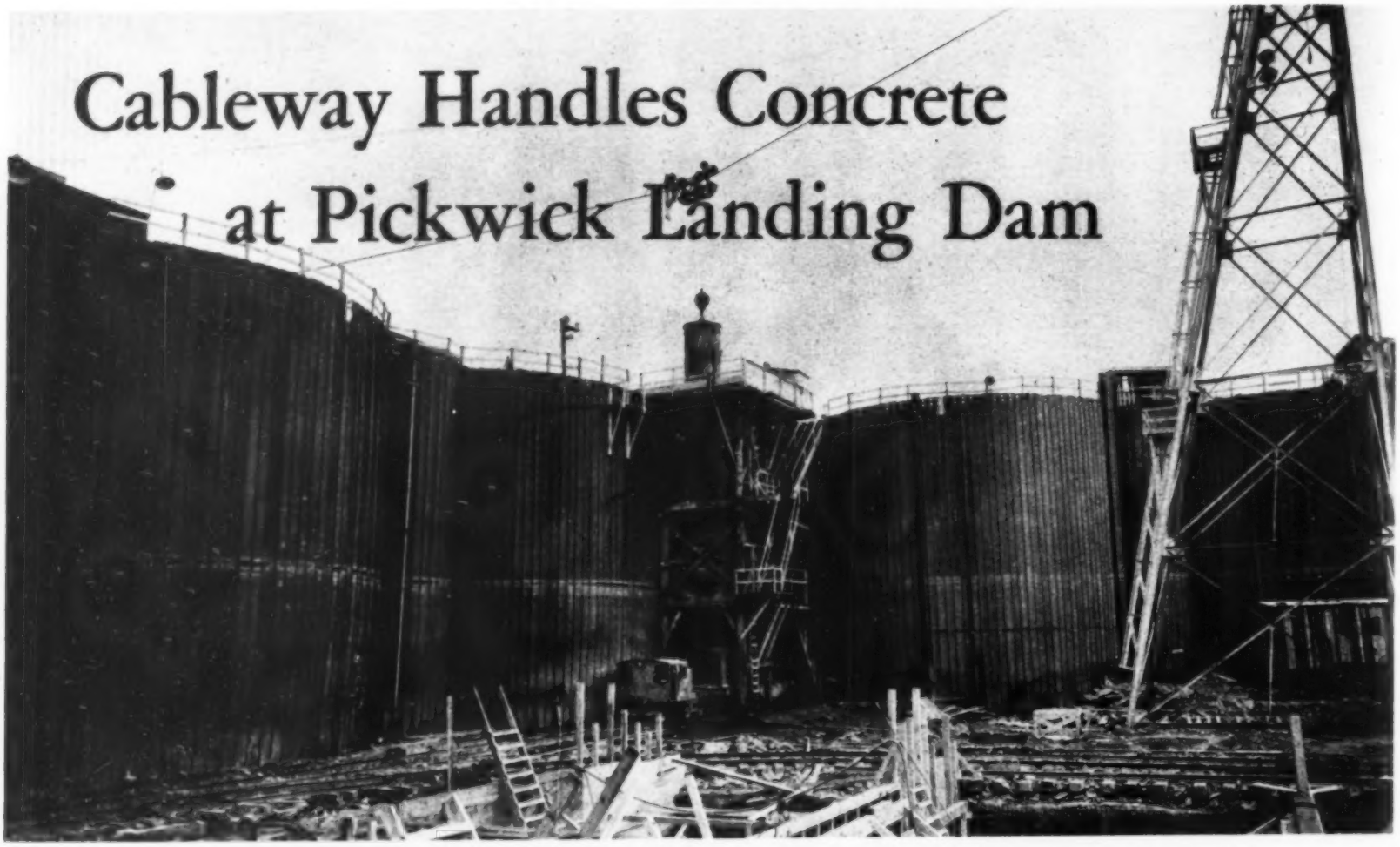
AFTER SPACING RING has been cut out by oxy-acetylene torch, mechanics use gaskets as templets to punch locations of drill hole centers.

ELECTRIC DRILL operated by power from welding generator sinks holes at punched locations on spacing ring.

Parker Dam Site

AT POINT 155 mi. below Boulder dam, bed of Colorado River has been unwatered between cofferdams while flow is bypassed through two 29-ft. diversion tunnels. Excavation to reach rock foundation at extreme depth of 230 ft. below streambed is in progress by J. F. Shea Co., contractor, for U. S. Bureau of Reclamation concrete arch structure 340 ft. high above low point of foundation and 800 ft. long at crest. Parker dam will divert Colorado River water into the Colorado River aqueduct being built by the Metropolitan Water District of Southern California. View in photograph is looking downstream from California side. Unique feature of dam is that most of it will be below ground; of total height of 340 ft. only 110 ft. will extend above river.

Cableway Handles Concrete at Pickwick Landing Dam



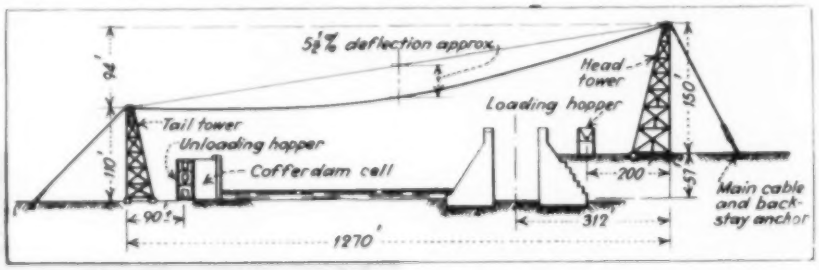
CONCRETE RECEIVING HOPPER in cofferdam receiving load from the 5-yd. concrete cableway bucket. Concrete transfer car is taking on load. Cable tail tower is shown at extreme right.

A FIXED CABLEWAY to transfer the concrete from the central mixing plant on the south bank of the Tennessee River to the working areas in the cofferdams for the second and third construction stages is a feature of the concrete placing plant developed by the Tennessee Valley Authority for the construction of Pickwick Landing dam 53 mi. below Wilson dam. Concrete placing is now under way in the second-stage cofferdam which incloses the area previously excavated by dredging and which is to be occupied by the power house and part of the spillway. In the first construction stage concrete for the lock near the south bank was carried to the working area from the mixers by a 30-in. belt conveyor 245 ft. long. The third stage involves the construction of the remaining spillway section in the river channel.

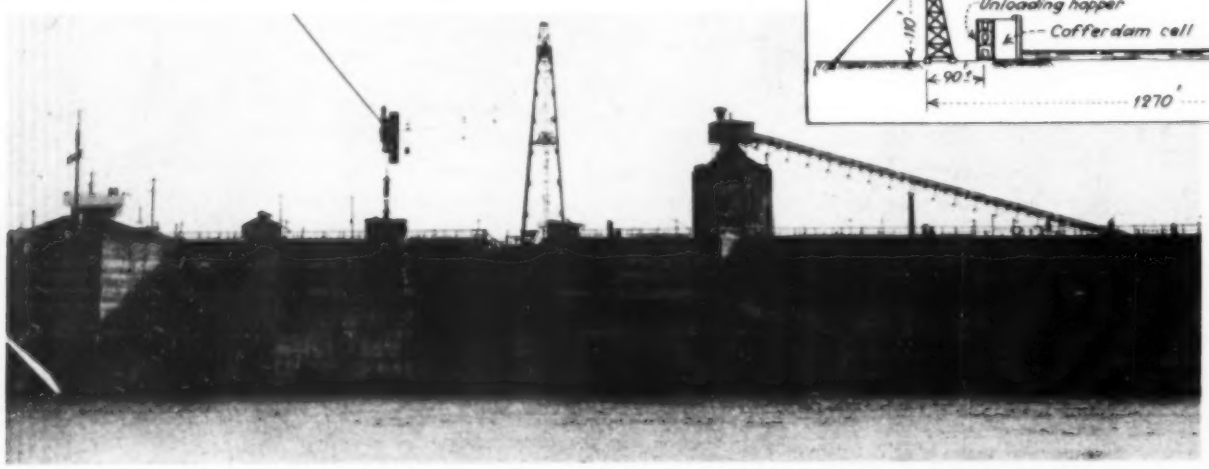
Planned Operations — Careful planning of the construction layout allowed the use of a central mixing plant for all stages of construction and the same cableway layout for the second and third stages. The second stage operations are on the opposite side of the river from the mixing plant and the cableway was designed to carry the concrete over the river to the near side of the cofferdam where it is picked up by concrete transfer trains and carried to within reach of the whirler cranes which finally place the concrete in the forms. For the third stage, the cableway will deliver concrete to a hopper discharging into the concrete placing buckets which will be swung into the forms by whirler cranes. The hopper will be shifted along the line of the cableway and will be opposite the whirler crane at all times, thus covering the entire third stage.

Cableway Spans River — The 12-ton capacity cableway span is 1,270 ft. from the 150-ft. steel head tower near the mixing plant to the 110-ft. steel tail tower in the cofferdam. The main track is a Seale type, Langlay, metallic core 2¾-in. diameter steel cable and is anchored at both ends to 90-cu.yd. concrete deadmen. A 75-hp. steam hoist in the head tower supplies power for the cableway operations and is fed by a 150-hp. boiler which also supplies steam to heat the aggregate in the mixers during cold weather. The elevation of the track cable at the head tower is 94 ft. higher than at the tail tower, which allows gravity load haul for most of the distance and decreases materially the time required for a hauling cycle.

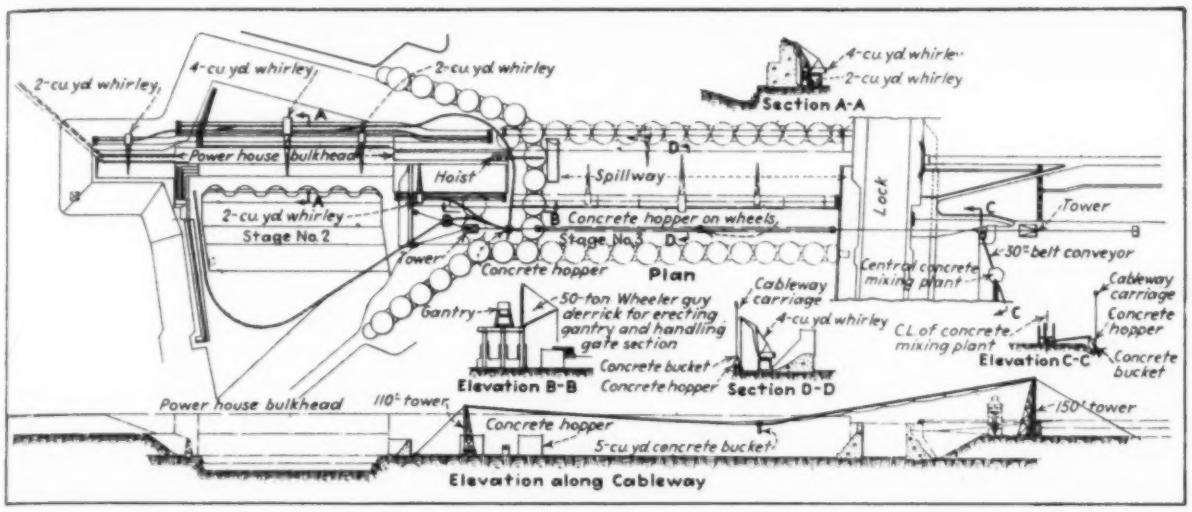
Concrete Transporting — Concrete from the mixing plant, which contains three 2-yd. mixers but normally uses only two, is carried to a cableway loading hopper by a 30-in. belt conveyor 192 ft. long. The loading hopper is fabricated steel, about 5x5 ft. by 12 ft. high, with the top 31 ft. above the ground, supported on a wood frame trestle and equipped with air-operated gates which control the discharge of the concrete to the 5-yd. cableway buckets. The hopper is 10 ft. from the center line of the cableway and is equipped with a half section of inverted cone-shaped grillage, with the top extending out under the cableway. The empty cableway bucket, which re-



CABLEWAY LAYOUT as it is used in the second stage of construction.



HEAD TOWER and mixing plant as seen from second stage cofferdam as cableway carries a loaded bucket across river.



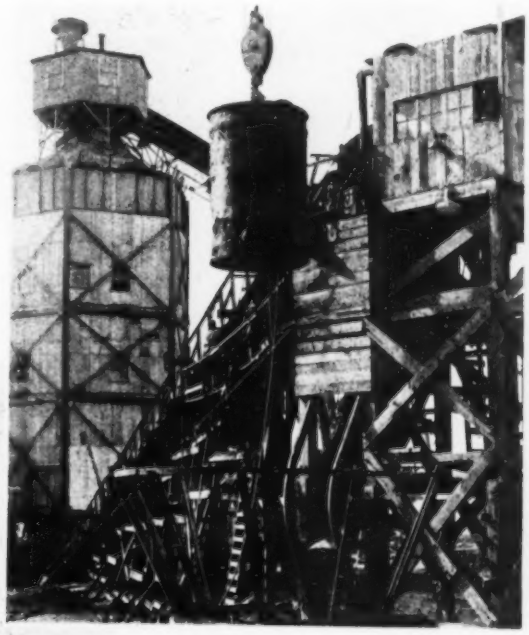
LAYOUT of concrete placing plant at Pickwick Landing Dam.

mains attached to the cableway at all times, is lowered into this cone section which drifts it into place below the loading chutes. Across the river, at the discharge point 990 ft. away, it is dumped through air-operated gates into the upper section of a double hopper providing a total capacity of 20 cu.yd. This hopper is made in two sections, the upper one receiving the load from the cableway and dumping to the lower one which feeds the buckets on the concrete transfer cars. The two-section hopper allows cableway dumping into the upper part before the lower is empty. This prevents segregation in the concrete and also saves the time of lowering the cableway bucket, the concrete dropping in steps by gravity about 35 ft. Discharge from the hopper is controlled by air-operated gates.

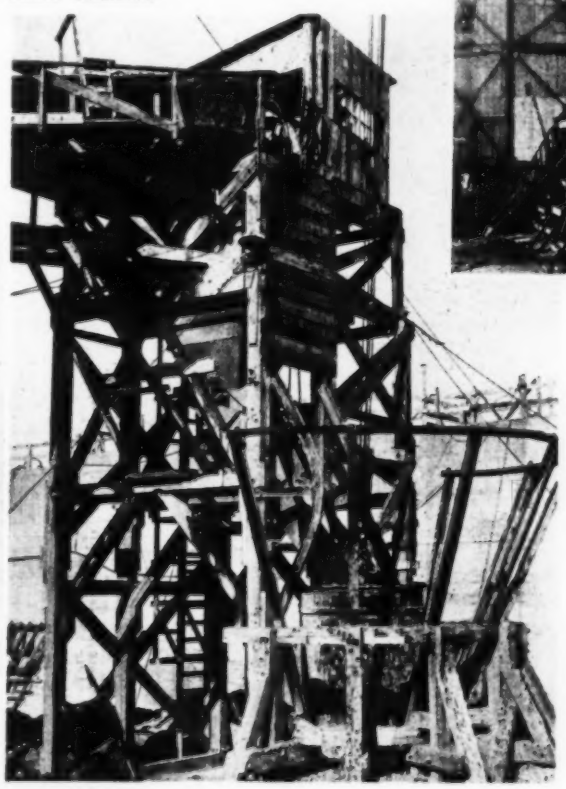
Concrete Placing by Gantry Cranes — Most of the concrete is received from the hopper in 4-yd. buckets mounted on railway flat cars, although 2-yd. buckets are used where concrete placing is to be in a small confined area. Each concrete transfer train consists of a 10-ton locomotive hauling one car which carries two buckets, with space for a third. The loaded buckets are hauled by train to within reach of the whirler cranes which lift and swing them to the forms, as illustrated. The loaded car provides space for the empty bucket that is dumped by the whirler while the train is loading.

The construction schedule provides for concrete placing at the rate of 27,000 yd. per month. The two 2-yd. mixers, operating on a 2½-min. cycle, can produce 96 yd. per hour or 58,000 yd. per month. The cableway, planned to operate at 14 to 15 cycles per hour, has averaged 16 cycles, equivalent to 80 cu.yd. per hour, with a maximum rate of 24 cycles, or 120 cu.yd. per hour. The cycle time of the operation, when handling 15 bucket loads per hour, is broken down as follows:

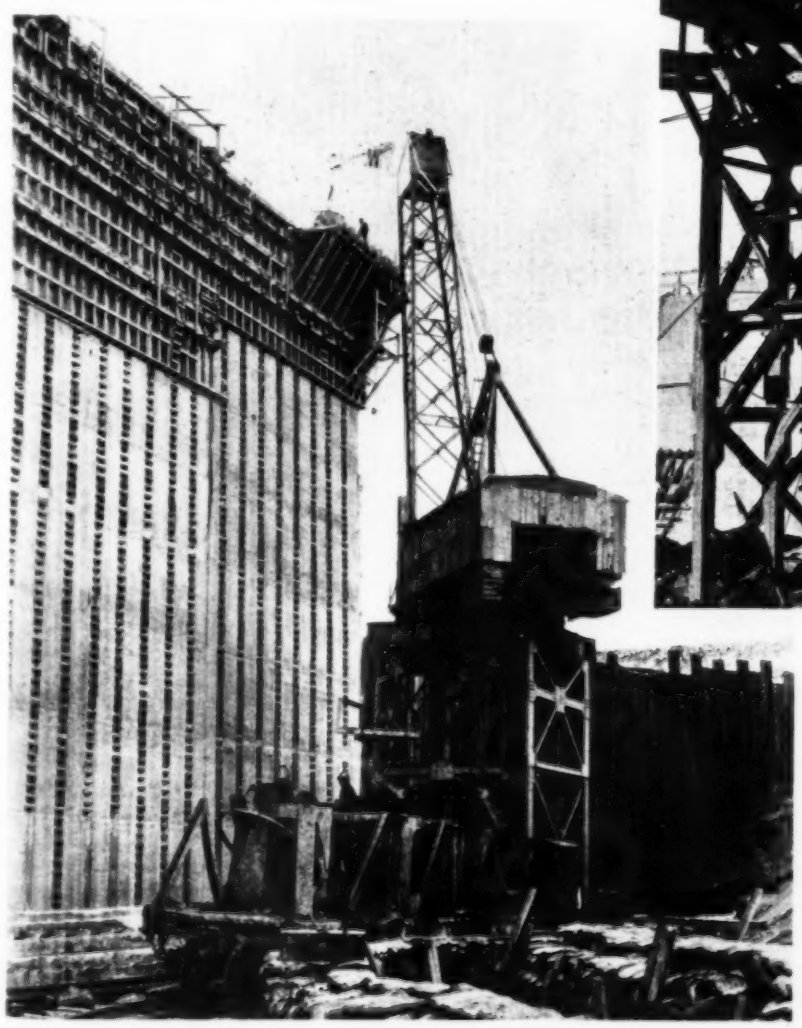
(1) Loading and lifting full bucket, 38 sec.
(2) Crossing river with full bucket, 69 sec.



MIXING PLANT *(right)* and belt conveyor carrying concrete to loading hopper feeding buckets.



CABLEWAY LOADING HOPPER, with bucket in place receiving load. Circular grillage extends out beneath cableway and slides bucket struction of dam.



GANTRY CRANE lifts concrete bucket from railway car and takes it to forms where it is dumped.

(3) Lowering and dumping bucket, 21 sec.
(4) Returning bucket to loading hopper, 112 sec.

The large bulk of the concrete has been and is being placed by a 4-yd. whirler crane, gantry-mounted on wide gage railroad track and supplied by two concrete trains which together can make 12 trips per hour, handling 96 yd. The whirlers can place from 30 to 45 bucket loads per hour, depending on the lift required, providing ample handling capacity for any delivery rate of which the cableway and transfer trains are capable. The 2-yd. whirlers are used to supplement the large one in placing operations.

Personnel — Arthur E. Morgan. is chairman and chief engineer of the Tennessee Valley Authority. Carl A. Bock, assistant chief engineer, is in direct charge of the engineering and construction on TVA dams. T. B. Parker is chief construction engineer; Ross White, general construction superintendent; C. H. Locher, construction consultant; and A. J. Ackerman, construction plant engineer. For Pickwick Landing dam, A. L. Pauls is project engineer; R. F. Olds, construction engineer; and J. E. Walters, construction superintendent.

Adding 275,000 Cu. Yd. of Concrete to O'Shaughnessy Dam

SAN FRANCISCO looked ahead when O'Shaughnessy dam was planned and 15 years ago built the foundations for the additional height and thickness now going in. By placement of 275,000 cu.yd. of concrete the original structure is being thickened to the ultimate cross-section, raised 85 ft. and 154,000 acre-ft. of storage capacity is being added to the reservoir. Particular interest attaches to the project because of the engineering problem involved in bonding the new, arched layer of concrete to the original structure so that the completed dam will function as a single monolith. The dam has a gravity section, is arched in plan and was built to the present height of 226 ft. above stream bed in 1922. When the addition is completed the total height of the structure from the lowest point in the foundation to the crest will be 430 ft., making it one of the world's highest dams.

When the original work was done the full section of the dam for the ultimate height was brought up to stream bed level. Here the thickness was decreased in one step to 80 ft. less than the ultimate section and on this thinner section was carried up to the initial height. A stepped surface on the downstream face was left to permit of effective bonding when the later addition was put on.

To avoid shrinkage between the old and the new concrete the new layer is being put in with great care, using a refrigerator system for cooling similar to that employed at Boulder dam. Also, slots are left on radial lines as well as between the old and the new portions of the structure. Thus the final layer of concrete filling in these slots (both radial and circumferential) is not put in until shrinkage has taken place and the concrete is well cooled. The slots vary in width from 3¼ ft. at the center of the arch to about 8 ft. at the haunches of the arch. Grouting at contraction joints will be carried on as required. To improve the bond the surface of the old concrete was roughened and reinforcement embedded in both old and new concrete extends across the plane of separation.

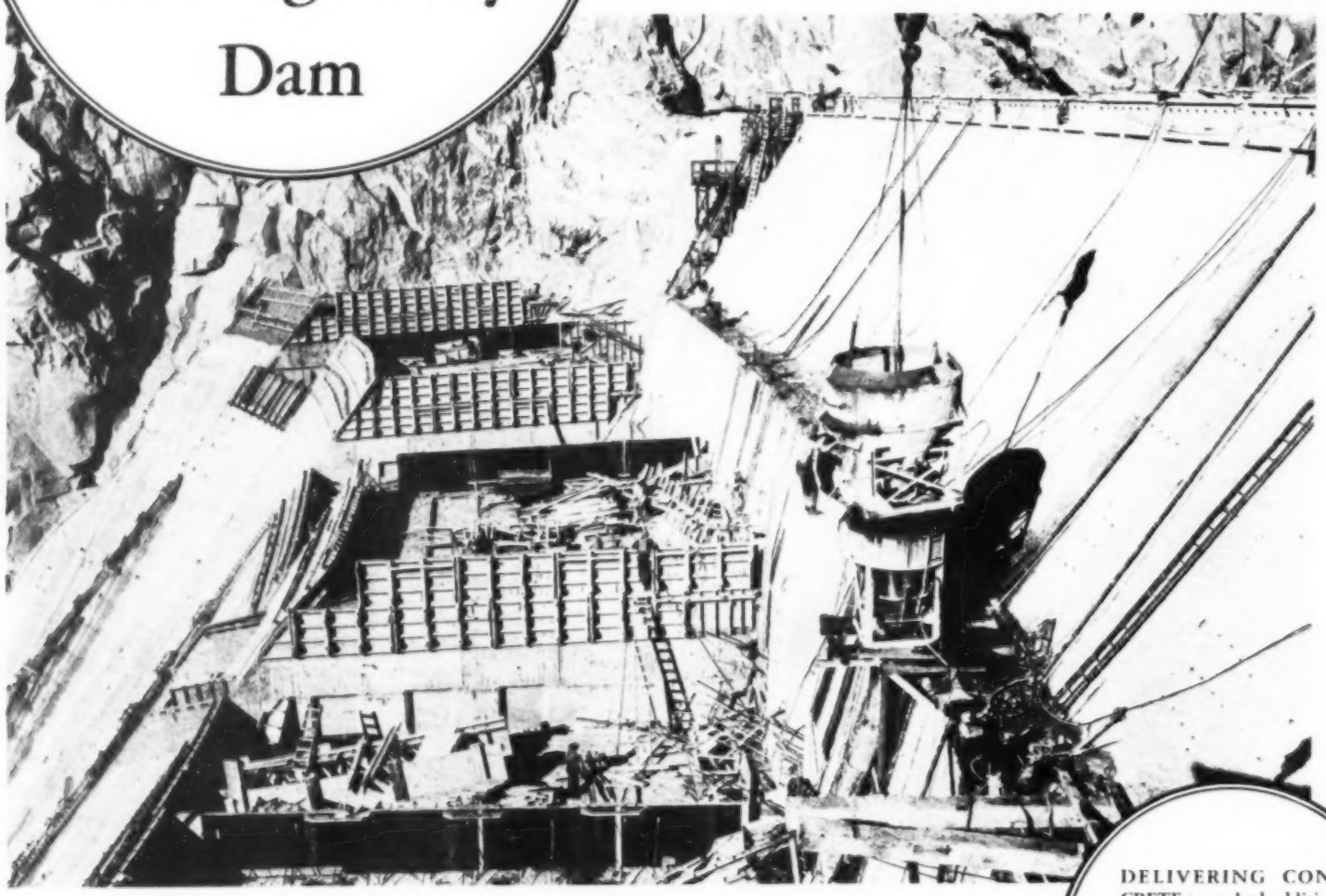
The quarry from which the rock for the aggregate is taken is upstream from the dam on the left bank, about 1,000 ft. from the mixing plant on the bluff above the dam south abutment. Quarried rock is trucked to a crusher, whence the several aggregate sizes (maximum of 6 in.) are moved by conveyor belt to a bunker. From the bunker to the stockpiles at the mixing plant the trip is made via the 6-cu.yd. skips of an aerial tramway.

Sand is obtained from one of the tributaries to the reservoir about 3 mi. above the dam. From the pit trucks deliver it to bunkers that feed a 3-mi. aerial tramway. This tramway is operated entirely by gravity because the upper end is nearly 2,000 ft. higher than the delivery end of the line and the weight of loaded buckets is ample to pull up the empties.

Concrete requirements are for a 3,500-lb. concrete after 28 days. In the mass concrete, slump is controlled between 1½ and 2 in. Four sizes of rock and one size of sand are used in the batches which go from the weighing equipment to two 4-cu.yd. mixers. Cement comes to the job by trucks, is pumped into a silo whence gravity, supplemented by a screw conveyor, delivers to the batching equipment. The mixing plant is designed on the basis of a delivery of 100 cu.yd. of concrete per hour. Skips in two sizes (4 and 8 cu.yd.) are used on an overhead cableway for delivering concrete into the forms.

Contract for the addition to the dam was awarded in April, 1935, and by the end of 1936 a little less than half the total yardage to be placed in the addition had been put in. The schedule for completing the job calls for delivery of about 25,000 cu.yd. of concrete per month. Contract is held by the Transbay Construction Co. and is being carried out under the direction of the Hetch Hetchy Water Supply Department of the Public Utilities Commission of San Francisco, L. T. McAfee, chief engineer and manager; Leslie W. Stocker, chief civil engineer. John H. Ryan is construction engineer on the dam.

The rock crusher is an Allis-Chalmers; the conveyor belt is made by the B. F. Goodrich Co., the concrete mixers are made by Norris K. Davis, Inc.; batching and weighing equipment by C. S. Johnson Co.; and compressors by Ingersoll-Rand Co.



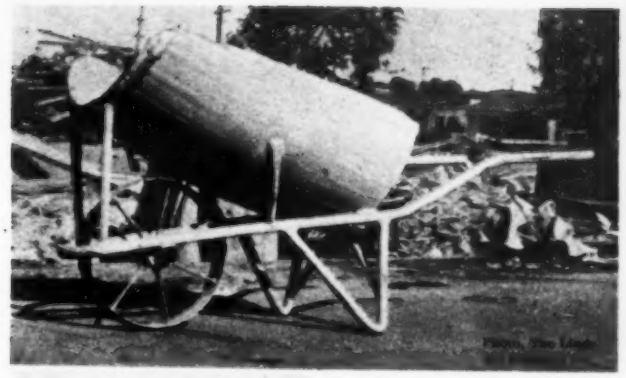
DELIVERING CONCRETE to arched addition by cableway. Note operator putting weight on bucket lever that discharges batch into slot between old and new concrete.

JOB ODDITIES

A MONTHLY PAGE OF

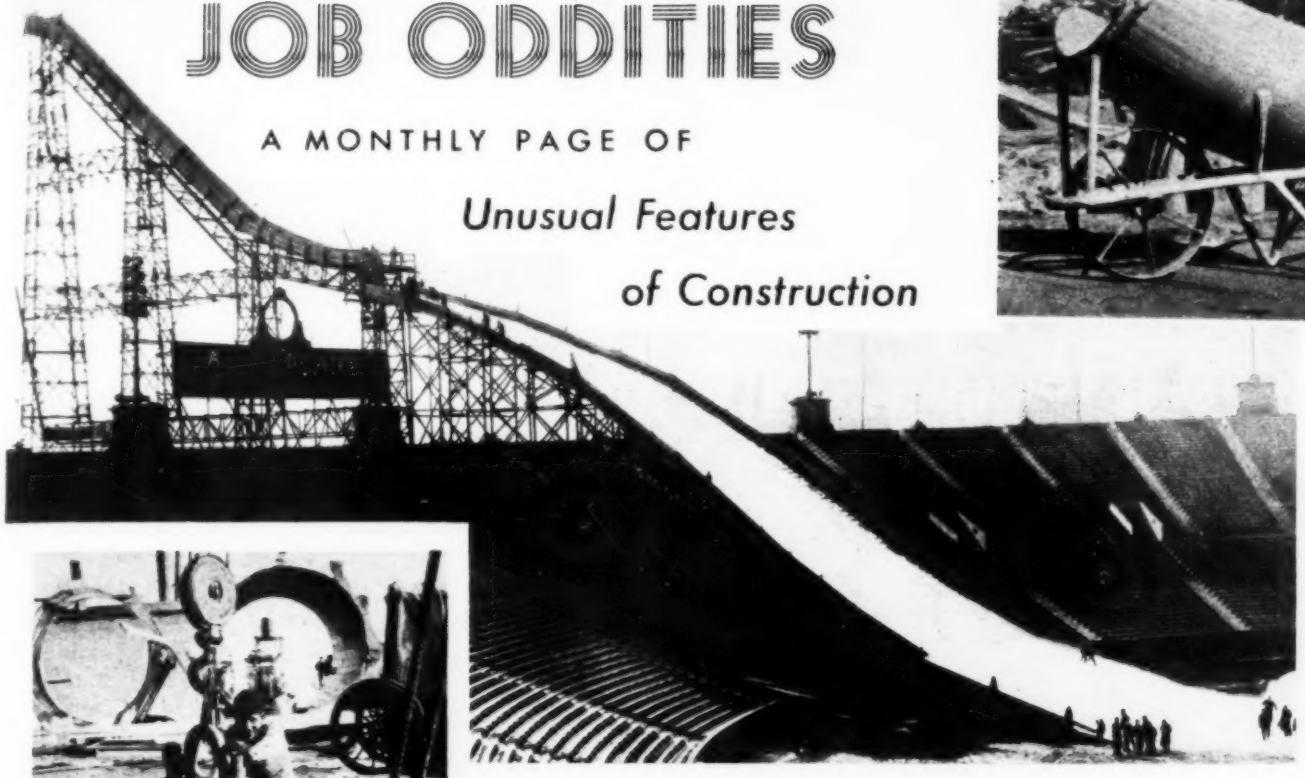
Unusual Features

of Construction



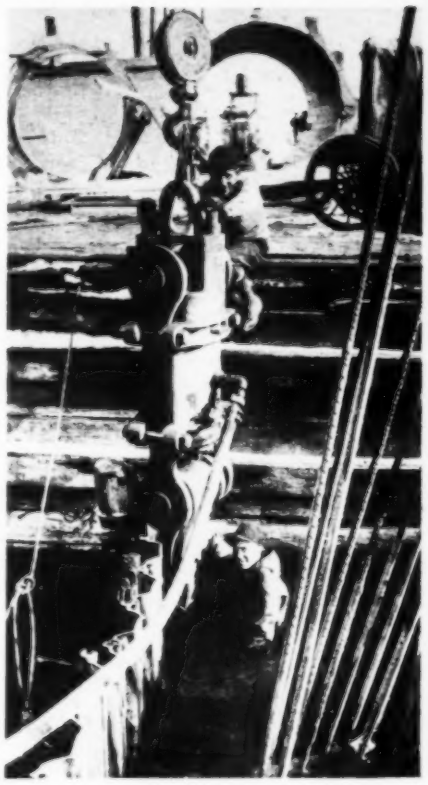
WELDED WHEELBARROW

fabricated out of scrap material has one-half of oil drum as body and old ¾-in. pipe as frame and handles. Oil drums were cut by blow-pipe and welding was done by oxy-acetylene flame. Wheel is from old cultivator.



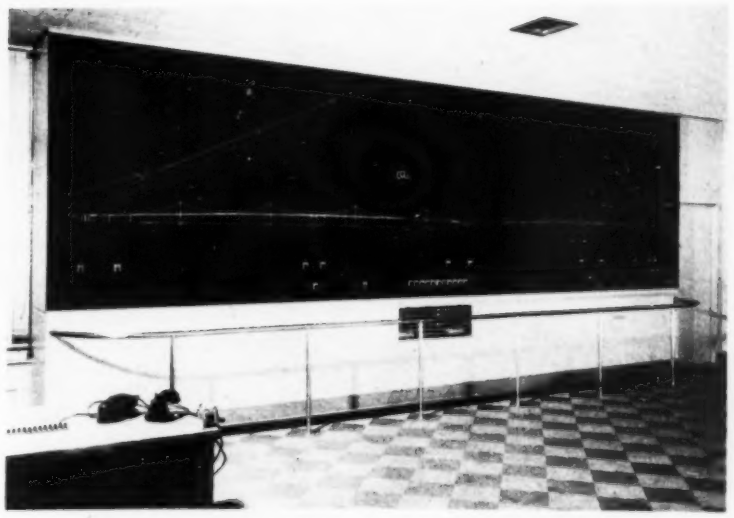
TIMBER SKI JUMP

is built to height of 180 ft. in Chicago's stadium. Erected with aid of split-ring connectors, structure designed for demounting and storing during summer consists of two sections, a timber tower and truss section outside stadium supporting curved runway and a curved timber trestle extending to ground level.



PILE PULLER

(left) **is hooked on to steel sheeting 2 ft. under water by worker in old diver's suit standing on waling at site of Missisquoi Bay bridge at East Alburgh, Vt. —** ***Photo from*** **G. H. MACDONALD,** ***Buck-MacDonald Co., subcontractor, Boston.***



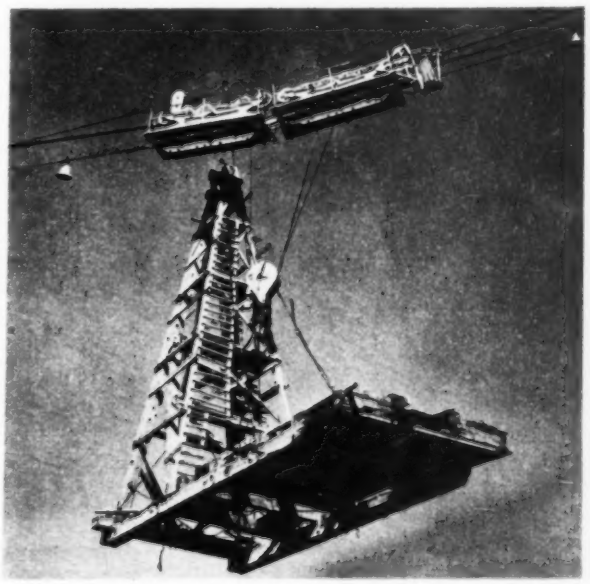
INDICATOR AND CONTROL BOARD

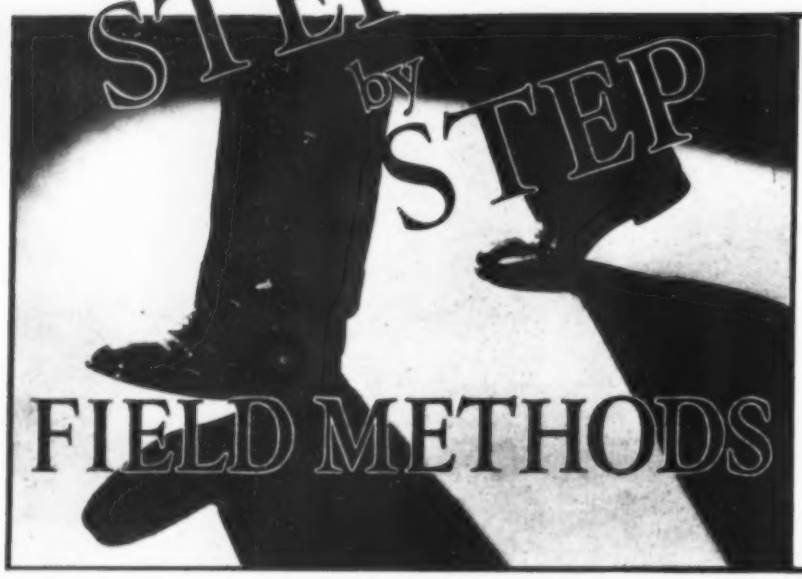
is feature of operating room for San Francisco-Oakland Bay Bridge, San Francisco. Formed of micarta and measuring 25 ft. in length, board, with bridge elevation to scale, duplicates bridge roadway lights, navigation and aviation signals and shows all important electrical regulating devices, with lamps to indicate condition of all circuits.

"Gosh, Gus, I'll be glad when we get up another story."

AERIAL TRIP

(right) **across Columbia River at Bonneville dam, in Oregon, is made by heavy bulky pile-driving frame suspended from one of the 2,025-ft. cableways of the Columbia Construction Co. Crosby clips aided in rigging the unwieldy load for transport, according to D. P. Williams, superintendent of cableways and rigging for the contractor.**



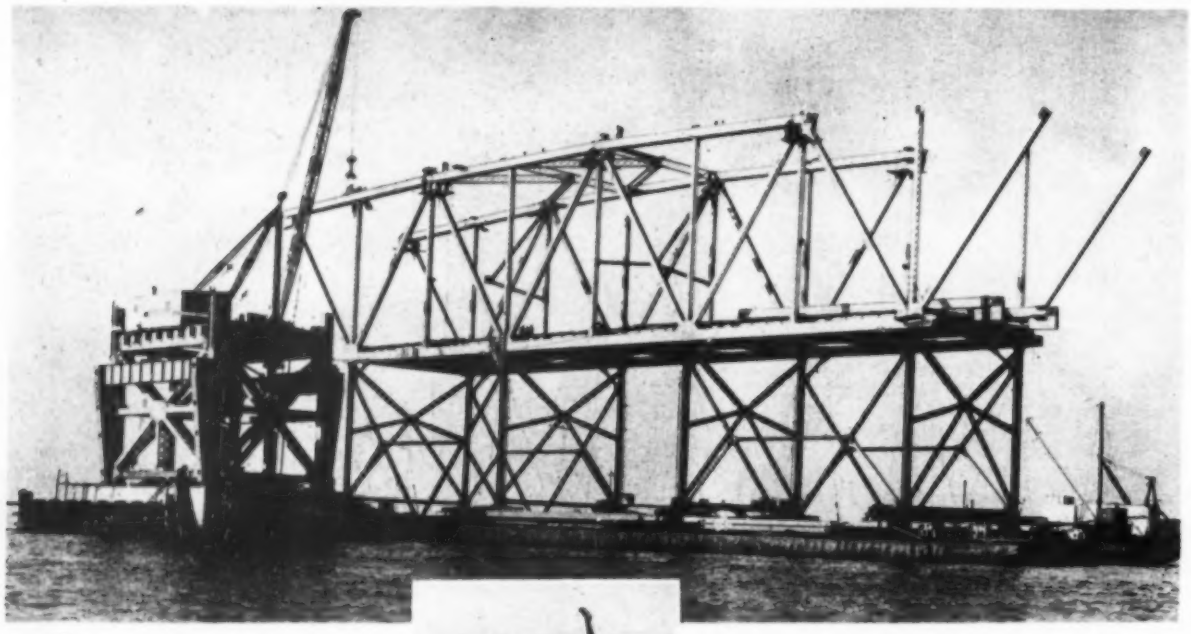


Floating Falsework

Carries

Longest Highway Lift Span

During Assembly and Placing

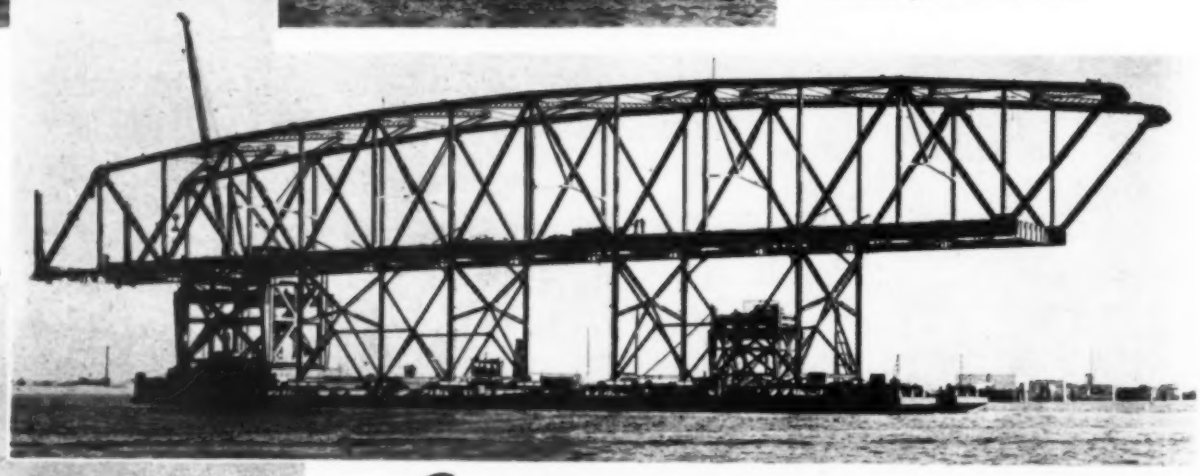


highway lift span ever built, had been assembled on four steel bents 50 ft. high (resting on the car floats) by a stiff-leg derrick set on one of the incompleted towers. During assembly the floating span was moved past the derrick to bring all parts within reach of the boom.

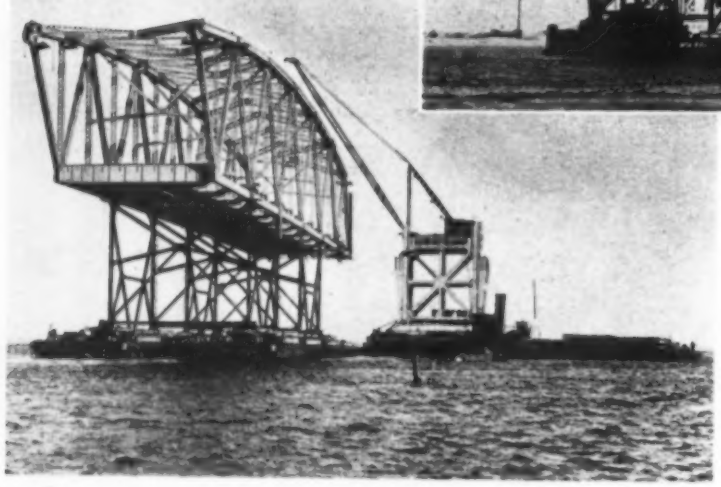
Similar procedure is being followed in the erection of two 540-ft. through truss spans, adjacent to the lift span, which are duplicates of it. As a departure from ordinary practice, temporary towers are placed on the lift span for the erection of the permanent towers rising 200 ft. above the concrete piers. One of the flanking spans is to remain open for shipping until the lift span can be raised.

1 ASSEMBLED ON FLOATING FALSEWORK by stiff-leg derrick set in fixed position on partially completed tower, 540-ft. lift span moves past derrick as erection proceeds.

Eric J. Baker Photos



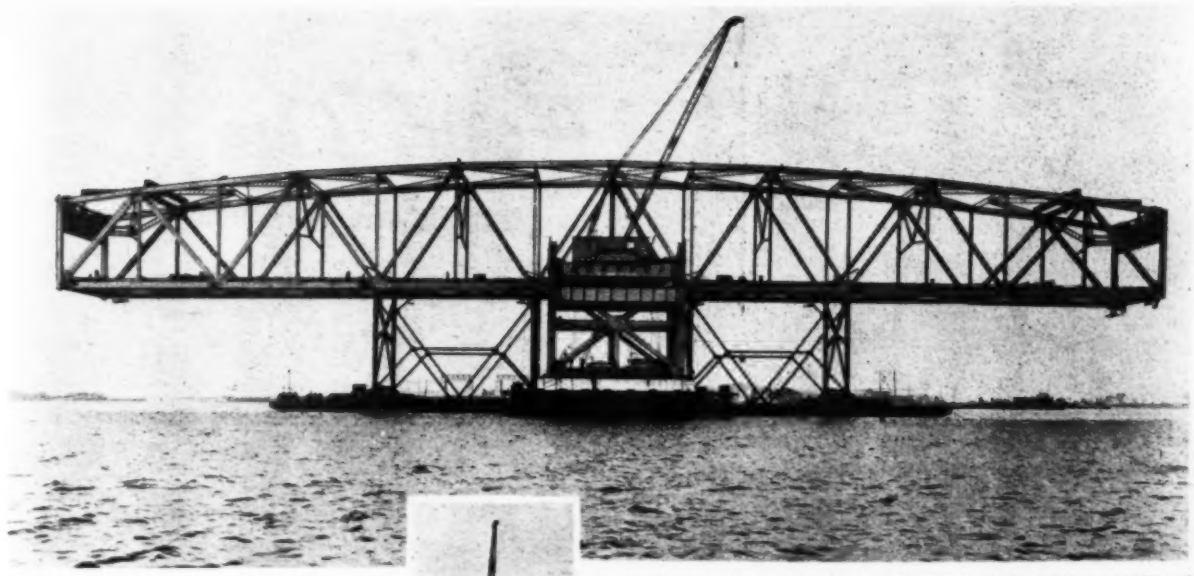
2 FOUR STEEL BENTS 50 ft. high resting on two car floats carry 540-ft. span during assembly by derrick. Nearing completion span is maneuvered into position for erection of steel members in end panel.



3 WITHIN REACH OF DERRICK BOOM long span is assembled on falsework bents resting on pair of car floats, each 38 ft. wide by 325 ft. long, which are shifted as required to put superstructure in position for progressive erection.

RIDING on two large car floats which had supported it during assembly, the 540-ft. lift span of the Marine Parkway bridge across Rockaway Inlet, New York City, moved into position at high tide in the early morning of Jan. 12 and came to rest on the brackets of its two operating towers, which had been built to deck level by the American Bridge Co., contractor. The 540-ft. span, longest

Car floats 325x38 ft. in size carry the falsework on which the three duplicate spans are erected. The 540-ft. lift span is the central feature of the bridge. On each side, beyond the flanking through truss span, are six deck truss spans 214 to 97 ft. long. Steel for the three central spans is brought to the site in barges. Other spans are to be assembled complete on car floats at a Staten Island railroad yard 5 mi.

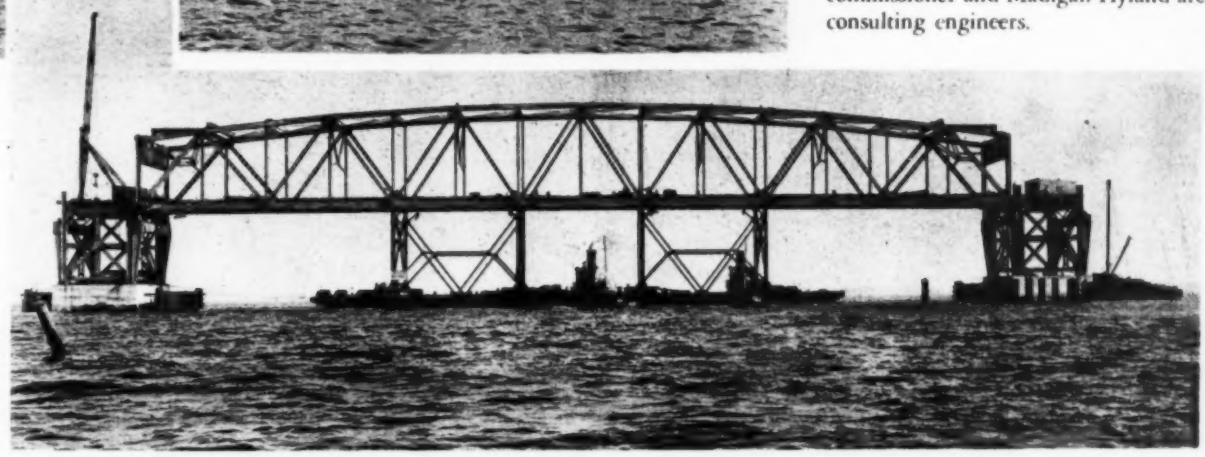


4 COMPLETELY ASSEMBLED and ready for placing on tower brackets, lift span awaits favorable conditions for floating into place.

from the bridge and towed to the site.

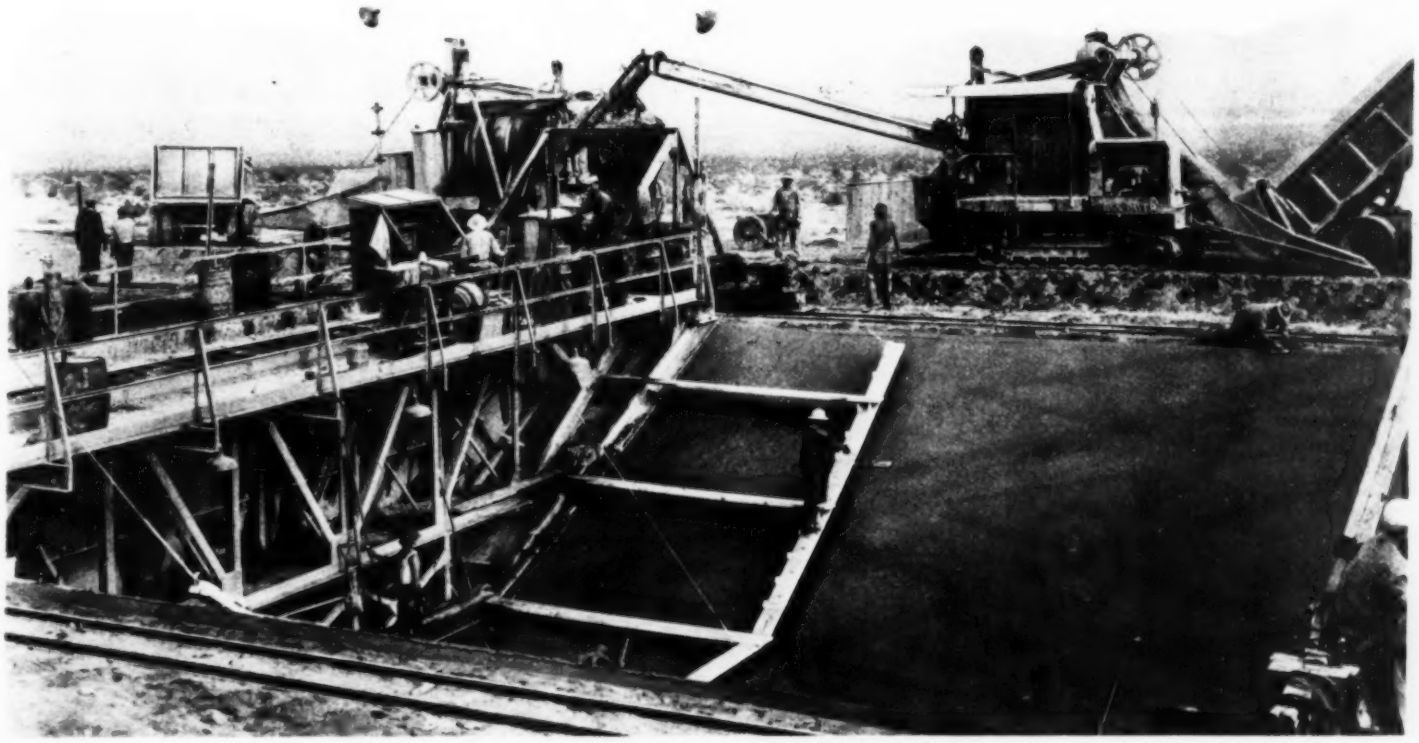
In length the lift span is exceeded only by the Cape Cod canal railroad lift bridge, which has a movable span 544 ft. long. The weight of the Marine Parkway span is 2,250 tons, as compared with 2,750 tons for the lift span of the Albany-Rensselaer highway bridge. In the new bridge open-mesh steel decking weighing 25 lb. per square foot saves weight over more familiar flooring designs.

The Marine Parkway bridge crosses the entrance to Jamaica Bay, on the south shore of Long Island, and connects Brooklyn with Jacob Riis Seashore Park in Rockaway, Queens. Foundations for the bridge were built by the Frederick Snare Corp., New York City, and the superstructure is being erected by the American Bridge Co. Waddell & Hardesty, consulting engineers, New York City, designed the bridge for the Marine Parkway Authority, of which Robert Moses is commissioner and Madigan-Hyland are consulting engineers.



5 AT HIGH TIDE tugs maneuver floating span into position between towers erected to deck level. Hydraulic jacks on bracket struts raise span clear of falsework and then lower it into place on supporting piers.

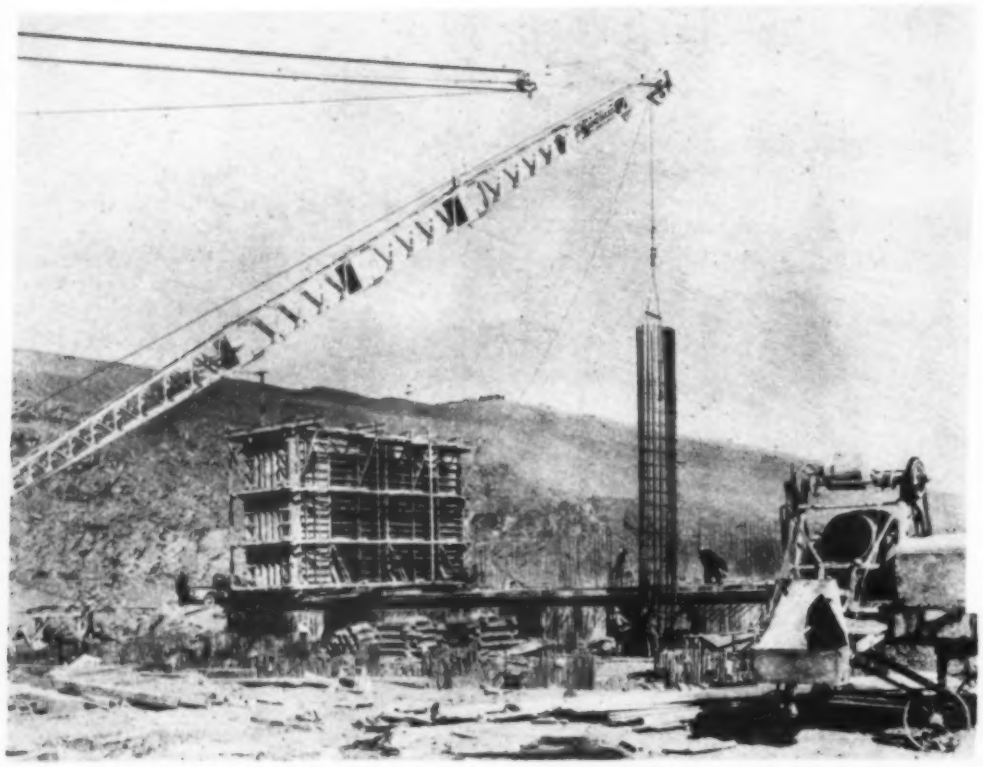
Twin Pavers Line Canal



HOW CONCRETE LINING is mixed and placed on an open-cut canal section of the Colorado River Aqueduct in California, being built under the direction of the Metropolitan Water District of Southern California. A pair of Rex paving mixers, charged by batch-trucks, operate on bank, with boom ends elevated and spotted over charging hopper, into which buckets discharge. Form carriage travels along as lining is placed and finished on sloping bank.

How They Did It—

CONSTRUCTION DETAILS For Superintendents and Foremen



PREFABRICATED CAGES

of steel reinforcement are lowered by 100-ft. crane boom into 5-ft. diameter holes bored in shale by special auger for concrete piers to carry sixteen heavy stone gates at spillway of Fort Peck dam, U.S. Army Engineer project on Missouri River Montana. After steel is placed holes are filled with concrete.

Armco Culvert Photo

EMBANKMENT SODDING

along Indiana state highway, near Lafayette, is speeded up by this movable platform on pneumatic-tired wheels. Sods, delivered by truck at top of fill, are slid down incline and bedded on graded slope to prevent erosion. Area sodded was 11,000 sq.yd.

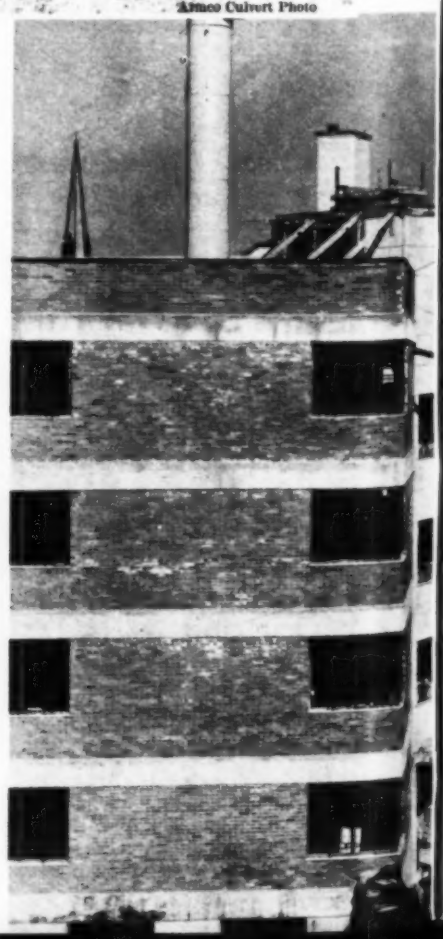
HOMEMADE BRICK-CLEANING DEVICE

proves useful in salvaging used brick relaid on 4th St., South, in St. Petersburg, Fla. Pump-handle rig with scraper plate removes old joint filler on WPA project involving relaying old 20-ft. pavement and widening to 40 ft. with additional new brick of vertical fibre type 2½ in. thick.

Wide World Photo

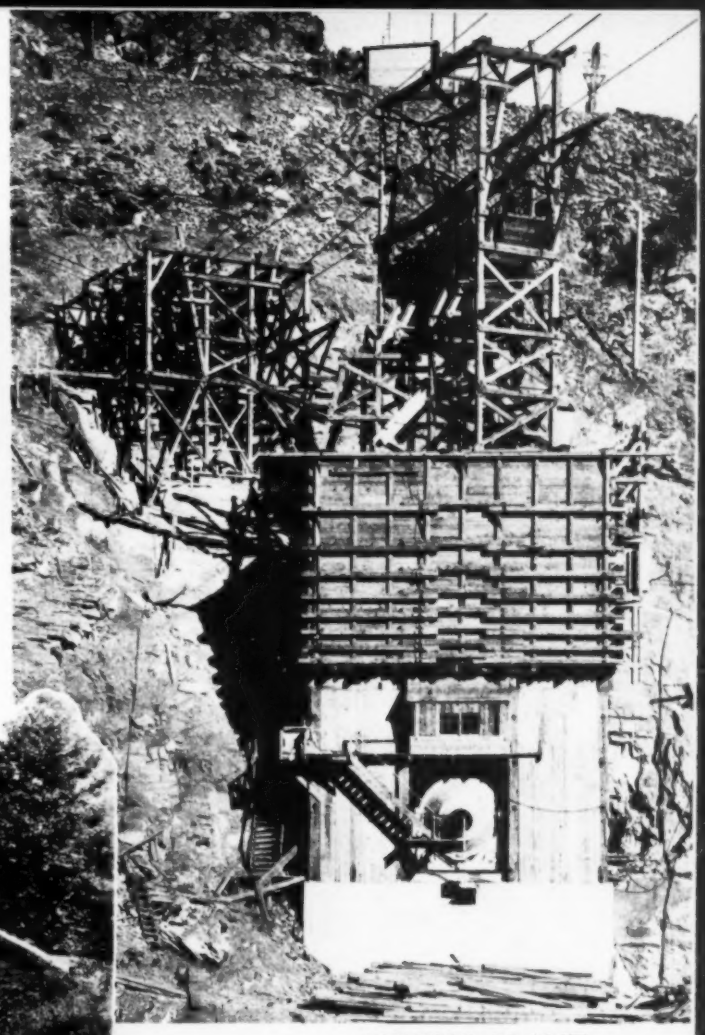
TAMPING MACHINE

(right) of German manufacture, exhibited at recent Leipzig Industrial Fair, consolidates earth fills and subgrades for highway construction.



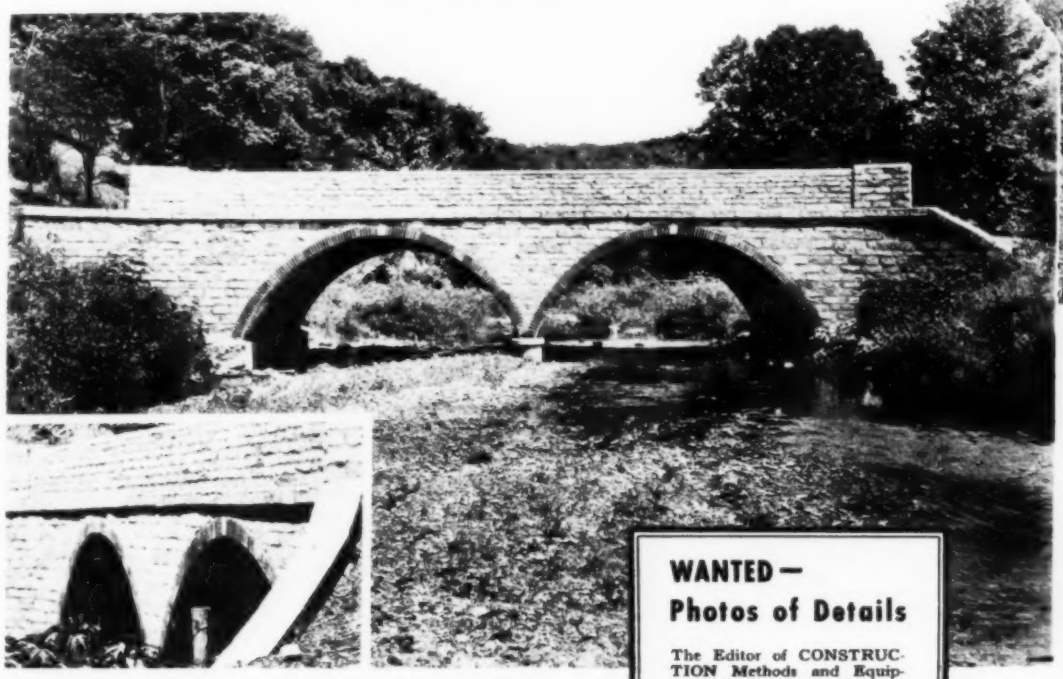
CRANE TEAMWORK

is called in to play by Fred Luttjohann, contractor, for setting 24-ton plate girder, 86 ft. 3 in. long and 7 ft. deep, at highway overpass crossing Missouri Pacific R.R. tracks at Van Buren, Ark. Cranes are of different types, one a locomotive unit on railway truck and the other on crawler mounting. — *Photo from* L. A. McCAIN, *resident engineer in charge for Arkansas Highway Department.*



MIXING PLANT

for concrete at U. S. Bureau of Reclamation's Seminoe dam, principal feature of Casper-Alcova project in Wyoming, is served by aerial tramway which delivers aggregates from sand and gravel plant 4 mi. upstream to bins above mixer.



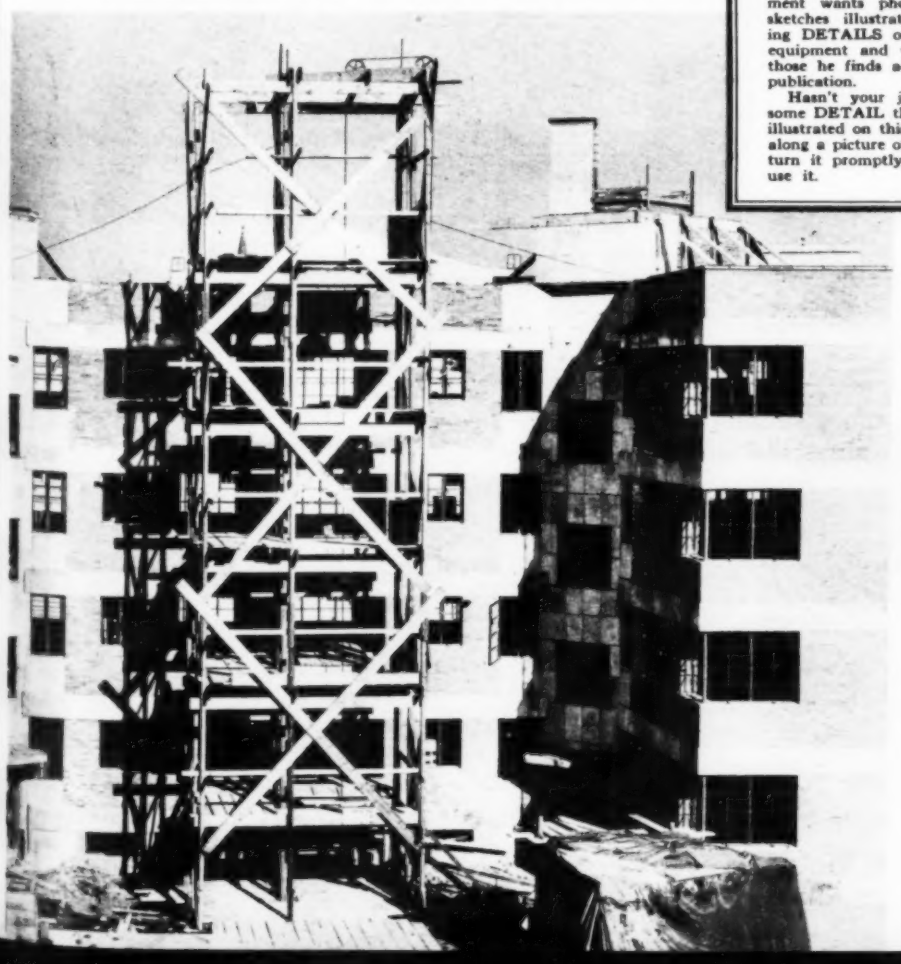
SECTIONAL PLATE ARCHES

(left) of Toncan corrugated iron form new twin-span highway bridge replacing old structure in mid-western state. Stone salvaged from old bridge forms headwalls of new structure. Bridge, carrying 23-ft. roadway, has arch spans of 20 ft., with rise of 6½ ft. Replacement cost approximately $6,000.

WANTED — Photos of Details

The Editor of CONSTRUCTION Methods and Equipment wants photographs or sketches illustrating interesting DETAILS of method or equipment and will pay for those he finds acceptable for publication.

Hasn't your job produced some DETAIL that might be illustrated on this page? Send along a picture of it; we'll return it promptly if we can't use it.



CORNER WINDOW

construction *(left)* on one of units of Ten Eyck Houses in Williamsburg section of Brooklyn, N. Y., $12,634,000 mass housing and slum clearance project being built by Starrett Bros. & Eken, Inc., New York builders, under supervision of Housing Division of PWA.

MIDGET GAS TANKS

carried on backs of operators, prove convenient in welding copper water seals at joints in Grand Coulee dam in Washington. Mobility of outfit is advantage, as welding must be done at different levels over wide concrete area. — *Photo from* DANIEL McFARLAND, *of Mason-Walsh-Atkinson-Kier Co., contractors.*

Planning and Plant for

SEVENTEENTH OF A SERIES OF ARTICLES

HEAVY CONSTRUCTION

Principles and Practices of Job Layout and Selection and Use of Equipment for Large Dams and Appurtenant Works

By ADOLPH J. ACKERMAN and CHARLES H. LOCHER
Construction Plant Engineer *Construction Consultant*
TENNESSEE-VALLEY AUTHORITY, KNOXVILLE, TENN.

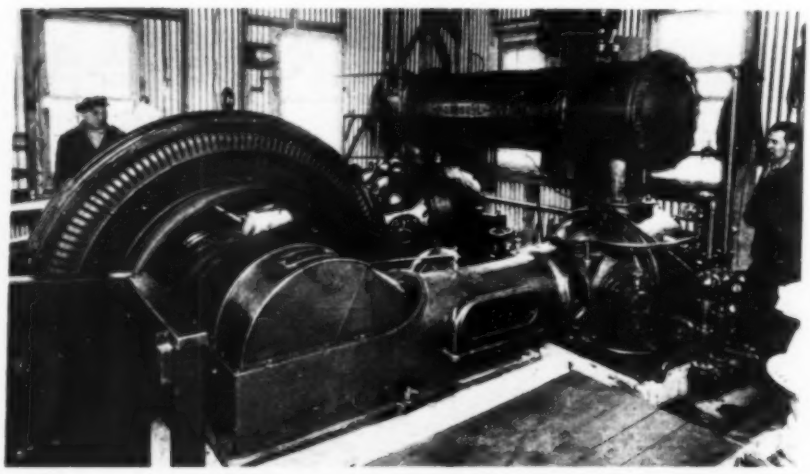
17 . . . Air Compressors, Drilling and Blasting

Compressor Plant

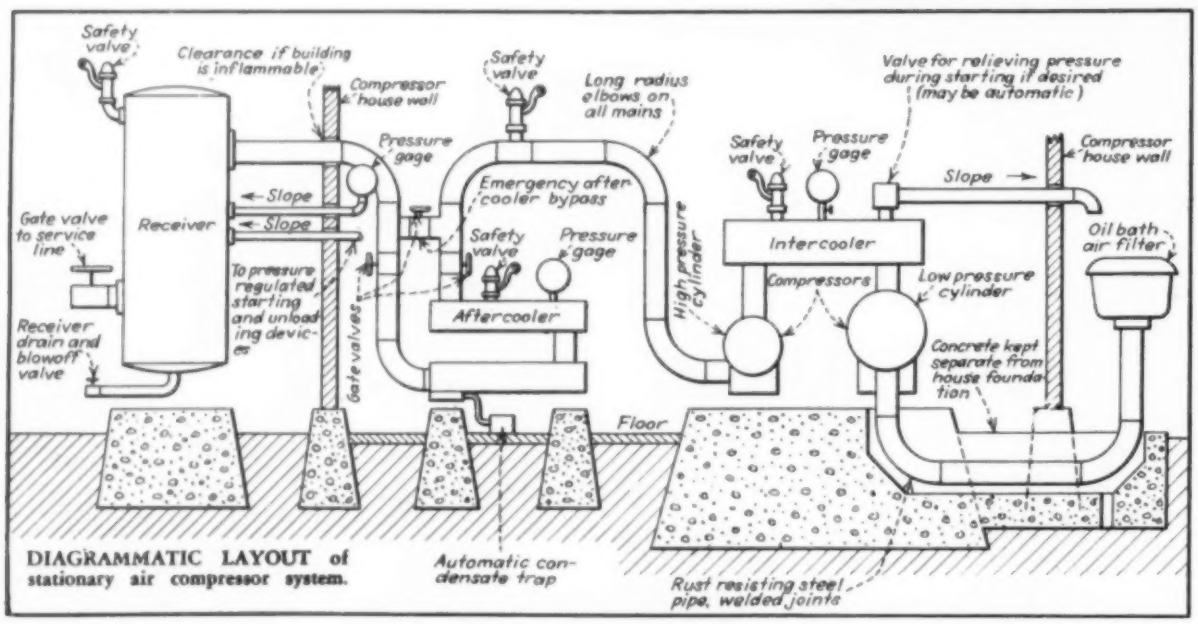
THE COMPRESSED AIR PLANT for a large job usually does not receive sufficient advance planning in proportion to its importance. A properly designed plant, in comparison with one that "just grows up," will be more efficient, will improve the performance of air tools and will result in less tool repairs and power consumption.

In selecting large compressors for a central plant the variation in load from month to month dictates flexibility, and on a large construction job it is usually better, for example, to have two 3,000-cu.ft.-per-min. compressors in place of one 6,000-cu.ft.-per-min. compressor, in spite of some extra cost in foundation and building. With the smaller machines it is possible to build up the air plant as the demand rises, and in cases of a machine breakdown the job will not be completely stopped. Smaller machines are more portable and can be moved off sooner as the demand on the job grows less in the later stages.

Portable compressors, either gasoline or diesel-driven, are available up to about 400 cu.ft. per min., in single or two-stage types. Stationary compressors in standard capacities up to 7,500 cu.ft. per min. are either gasoline, diesel, or electric-driven in one- or two-stage types. In determining the air requirements for a job an estimate is made of the consumption of all tools required, on the basis of their expected staggered operation, to arrive at a probable peak demand. The accompanying Table 1 and diagram present such an estimate and a layout for a project showing the use of air and the necessary piping system.

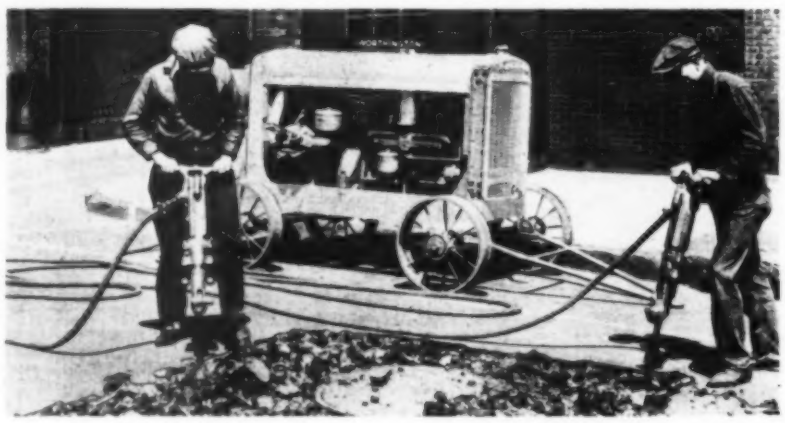


LARGE AIR COMPRESSOR installation for central station of construction project.



DIAGRAMMATIC LAYOUT of stationary air compressor system.

Rating — Air compressors are rated by piston displacement in cubic feet per minute, which is the volume swept by the piston in one minute. The actual output of a compressor is less than the piston displacement because of air left behind in the clearance spaces and because of leakage. For example, the actual output of a compressor rated at 6,000 cu.ft. per minute is about 5,290. The output of a compressor is equal to the volume of air actually compressed and delivered, measured at the intake pressure and temperature as free air, and not as compressed air. For discharge pressures of 70 lb. and above, two-stage



PORTABLE AIR COMPRESSOR *(right)* delivering air to paving breakers.

OUTPUT AND COST OF PORTABLE AND STATIONARY AIR COMPRESSORS, FULLY EQUIPPED

Air Output, Cu.Ft. per Min.	*Cost, Dollars*
PORTABLE COMPRESSORS (*Gasoline or Diesel*)	
100	1,750
200	3,350
300	4,150
STATIONARY COMPRESSORS (*Electric*)	
1,000	8,000
2,000	13,000
3,000	17,750
4,000	22,750
5,000	28,500

compressors are generally preferable because of their lower power requirement and reduced operating temperatures. For compressor capacities of 1,200 cu.ft. per min. and larger, a direct-connected synchronous motor with 80-per cent leading power factor for power factor correction is usually employed.

Cooling—Water-cooled intercoolers

TRIPOD DRILL *(above)* with hand screw feed.

WAGON DRILLS *(below)* drilling blast holes for foundation at Wheeler dam. Note line-drilled faces of rock in background.

are required between stages of two-stage compressors to reduce the temperature and volume of the air compressed by the low pressure cylinders. This volume reduction increases the amount of air entering and, therefore, delivered by, the high-pressure cylinder, and the temperature reduction condenses and removes moisture and improves lubrication. Compressing air to 100 lb. without intercooling or by single stage compression would result in an air temperature of about 485 deg. F.

Aftercoolers perform a function similar to intercoolers in reducing the temperature of air and in condensing moisture and oil after the air has left the final stage of compression. Wet air is detrimental to pneumatic tools, as it washes away the lubricants, interferes with pneumatic handling of cement, and is subject to freezing in valves, ports, and pipe lines. An aftercooler also reduces the pressure loss in distribution lines due to radiation, cooling and contraction of the air in the lines.

An air receiver for equalizing compressor discharge pulsation should be placed outside and near the compressor house. The receiver also serves as a condensing chamber for the removal of water and oil vapors. Its volume in cubic feet should be from one-sixth to one-tenth times the cubic-foot-per-minute displacement of the compressor, the multiplier decreasing as the compressor displacement increases.

Pipe Sizes — Pipe sizes for mains and branches should be ample and with a minimum of angles and turns to keep down pressure losses, which result in a greatly reduced output of air tools and equipment. In selecting the size of pipe for main lines the possibility of a future increase in length, or an increase in air requirements, should be kept in mind. Herewith are some of the pressure losses per 1,000 ft. of straight pipe at 100 lb. air pressure:

PRESSURE LOSS PER 1,000 FT. OF PIPE LINE

Diam. of Pipe (Inches)	*Quantity of Air* (Cu.ft. per min.)	*Pressure Loss* (Lb.)
3	1,000	9.3
4	1,000	2.2
4½	3,000	10.9
5	3,000	6.0
6	3,000	2.3

JACKHAMMERS used in drilling blast holes for dam foundation in cofferdam area at Grand Coulee.

The same principles, of course, apply also to hose. A 50-ft. hose length operating at a pressure of 80 lb. per square inch and carrying 100 cu.ft. per min. of free air will have the following losses:

PRESSURE LOSS IN 50-FT. HOSE LINE

Diam. of Hose (Inches)	*Pressure Loss* (Lb.)
¾	5.8
1	1.4
1¼	0.4

All bends in main air lines should be of long radius. Welded 45 or 90-deg. sharp angles should never be permitted. Where it is necessary to use elbows in the intake line they should be of long radius. A sharp intake elbow greatly reduces the efficiency of the compressor, since it is impossible to carry the air to the cylinder at the required rate properly to fill it.

Reheaters, placed as close as possible to the points of air use, are sometimes useful during cold weather. Reheating the air to 250 deg. F. increases the volume of air about 30 per cent, with a corresponding increase in working pressure. Reheating drys up the air, reduces the freezing nuisance and raises the operating efficiency of the tools.

Leaks — One of the most important problems on a job is the stopping of costly air leaks. Such leaks may be either in loose joints in the pipe lines or through excessive wear in pneumatic tools, with consequent low efficiency of operation. The accompanying table shows the loss per month of compressed air, assuming it valued at 10c. per 1,000 cu.ft.

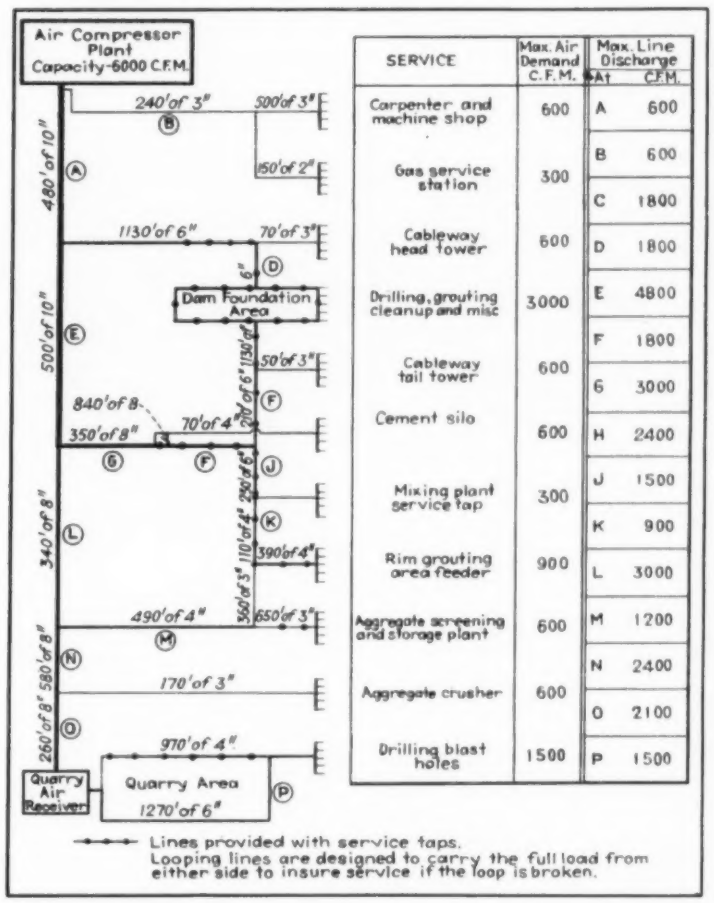
AMOUNT AND COST OF AIR LOSSES

Size of Opening (Inches)	Cu.Ft. Wasted per Month, 100 Lb. Pressure	Cost of Waste Per Month at 10c. per 1,000 cu.ft.
⅜	10,000,000	$1,000
¼	4,500,000	450
⅛	1,100,000	110

When one stops to realize that a ⅜-in. opening means a loss of $1,000 per month it is easy to understand that on a large job it would pay to keep a man employed just on checking up air leaks and installing suitable gages and metering devices to check air consumption at various points and make corrections wherever necessary.

Rock Drills

Drills may generally be divided into two main groups: (1) Percussion drills, which include jackhammers.



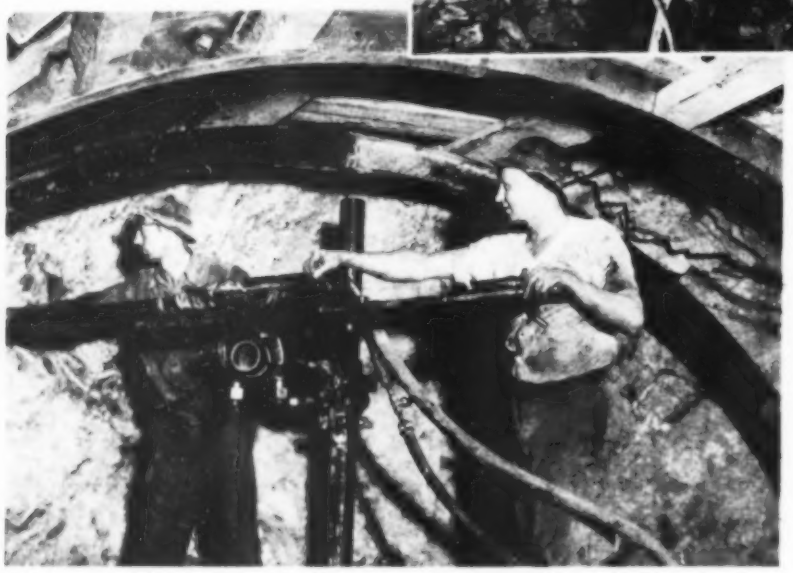
SERVICE	Max. Air Demand C.F.M.	Max. Line Discharge at	C.F.M.
Carpenter and machine shop	600	A	600
		B	600
Gas service station	300	C	1800
Cableway head tower	600	D	1800
Drilling, grouting cleanup and misc	3000	E	4800
		F	1800
Cableway tail tower	600	G	3000
Cement silo	600	H	2400
		J	1500
Mixing plant service tap	300	K	900
Rim grouting area feeder	900	L	3000
Aggregate screening and storage plant	600	M	1200
		N	2400
Aggregate crusher	600	O	2100
Drilling blast holes	1500	P	1500

COMPRESSED AIR DISTRIBUTION system for typical large construction job.

wagon drills and well drills; (2) abrasion drills, which include diamond and shot core drills. The selection of the most suitable type of drill depends, first of all, on the purpose for drilling the holes, and second, on the kind of rock to be drilled. Table 2, on drilling costs and performance, gives some relative comparisons for various types and sizes of drills, and while based on certain actual experiences, the extreme variations in rocks and other conditions prevent the data from being applied in a general way. Drill performance is affected by size, depth, and spacing of hole, type of terrain, character of overburden, hardness of rock, prevalence of seams and cavities, amount of ground water, conditions of equipment, efficiency of operators, and type and quality of supervision.

Percussion — The percussion drills include two main types: The hammer drill and the piston drill. In hammer drills, a blow is transmitted to a rotating drill rod loosely held in a chuck by a reciprocating piston driven by compressed air. The drill rod is usually hollow for blowing air or water through the rod to clear the hole of cuttings.

Piston — In the piston drill the drill rod is securely fastened to the piston and travels the full length of the piston stroke. Piston drills are now almost obsolete.



DRIFTER DRILL, with carriage mounting, drilling blast holes for tunneling.

Hammer — The hammer drills may be divided into jackhammers, or sinkers, and drifters. Jackhammers are unmounted, portable, hand-operated tools, mostly used in drilling vertical holes. The machines vary in size from 25 to 85 lb. in weight, and are best adapted to shallow work up to 10 ft. of depth and for secondary blast holes. The tripod drill is similar to a jackhammer, except that it is mounted on a tripod with legs weighted to provide sufficient stability. Tripods are usually very low and require drill changes every 3 ft. They are not much in use except on very hard quarry rock.

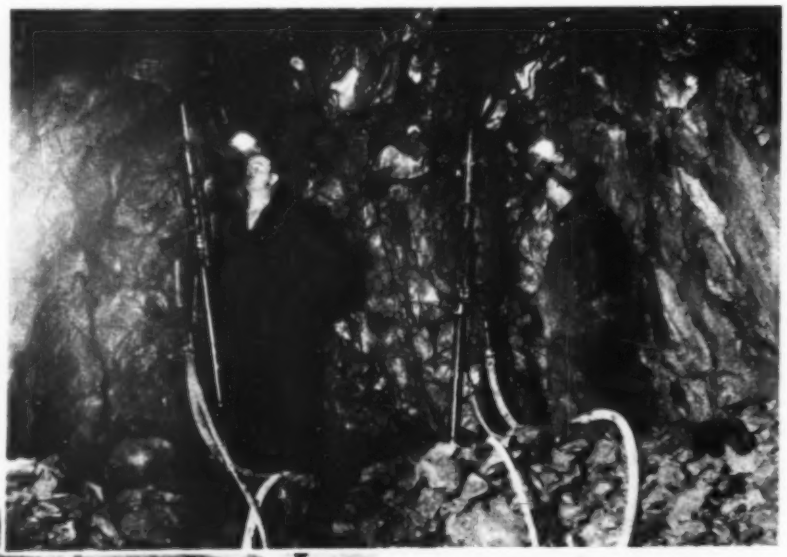
Wagon Drills

Wagon drills are best suited for quarry and foundation work with holes up to 30 or 40 ft. They may be arranged to drill in any direction and have an automatic feed, usually sufficient to permit 10-ft. depth for rod changes.

At Chickamauga dam, on the Tennessee River, wagon drills with jumbo detachable bits, 4½ in. in diameter, were used on 40-ft. blast holes and averaged about 8 ft. per gross hour. Wagon drills for shallow drilling on quarry and similar installations will lower the drilling costs over those of

Drifters — Drifter drills are mounted tools for drilling "up," "down," or "side" holes. They vary in weight from 75 to 225 lb. and are usually operated by a two-man crew. For horizontal or "up" drilling, the feed is usually by means of a hand or mechanically operated screw or a pneumatic or hydraulic pressure piston. When drilling "down" holes, as with a wagon drill, the weight of the drifter provides the necessary feed.

Stopehammers — Stopehammers are a modification of a jackhammer, with a thrust end to hold the drill against the work and are usually used for "up" holes. The feeding may be automatic or by hand.



STOPEHAMMER DRILLS used largely for mining and also for tunneling operations.

churn drills because of the increased drilling speed.

At Wheeler dam wagon drills were mounted on parallel tracks with wheels removed and skidded along in groups up to five for line drilling work on holes of 10 to 12 ft. in depth, as shown in one of the illustrations. At greater depths, it is difficult to obtain parallel holes.

Well or Churn Drills

Well or churn drills are of the reciprocating percussion type and are used for large blast holes from 3 to 8 in. or more in diameter. The bit is attached to a heavy bar lifted by line hoist and dropped into the hole, producing chipping and crushing by the weight of the blow. The loose material is bailed out or washed out. Well drills are usually used on very hard drilling, especially for quarry blasting, and can drill down hundreds of feet. They are operated either by steam or gasoline engine or electric motor.

Drilling progress is dependent largely on the weight of the drill tools, and for this reason a hole less than 5 in. in diameter is seldom practical. In fact, holes 6 and 8 in. in diameter can be drilled about as rapidly as a 5-in. hole, with relatively less wear on bits and equipment. A 6-in. hole can be driven through limestone at rates of 3 to 6 ft. per hour, and through trap-rock or granite at rates of 12 to 20 in. per hour.

DIAMOND CORE-DRILL for exploratory work on foundations.

Table 1 . . . Pneumatic Equipment
Air Consumption and Estimate of Air Requirements for Norris Dam

	Cu. Ft. of Air per Machine Required per Min. @ Approx. 80 lb. Press.	Number of Units Aver. On Job	Working	Total Air Required, Cu. Ft. per Min. (Diversity Allowed)
EXCAVATING EQUIPMENT				
Wagon drills—Drifters	230	16	8	1,380
Jackhammers	91	30	20	1,183
Clay diggers	75	2	2	150
Drill sharpeners	160	2	2	320
Oil furnace	75	2	2	150
Shank grinders	47	2	1	47
Blow guns—Blast hole	147	2	2	200
				3,230
				Diversified—3,000
CEMENT PLANT				
Blowing cone—Silo	186	1	1	186
Cement pumps	160	2	1	160
Grout pumps	220	4	3	660
Blow guns—Concrete clean	82	4	2	164
Concrete surfacer	50	2	2	100
				1,270
				Diversified—1,200
HOISTS—PUMPS—MOTORS				
Motor—Grout mixer	100	6	3	300
Pumps	100	3	2	200
Hoists	160	18	10	800
				1,300
				Diversified—1,000
MISCELLANEOUS TOOLS				
Paving breaker	55	1	1	55
Chipping hammer	25	9	6	125
Riveting hammer	42	12	10	336
Holder-on (Bucking Up)	25	4	4	100
Air wrench	75	2	2	150
Close quarter drill	75	6	4	225
Woodborer	50	7	5	200
Grinder	50	2	2	100
				1,291
				Diversified—1,000
Blowing out lines	200	—	—	200
				Diversified— 200
				6,400
				Diversified—5,000
				Line Loss 500
				5,500

Abrasion Drills

Diamond and shot core drills have their greatest value in exploration drilling where cores are essential in giving the necessary information regarding rock structure. Diamond drill bits run in standard sizes up to 3 in., providing a core of 2⅛ in. Above this size, the investment in abrasives becomes so large as to preclude the use of this equipment, and shot core drills are generally used.

In a sound rock which drills well a 1⅞-in. hole with a 1⅛-in. core may give good core recovery. In softer broken rock even the larger sized bits will recover only 10 to 20 per cent of the core. While drilling speeds are slower in comparison with diamond drill holes, the lower bit and abrasive cost is a substantial advantage. There is more core loss in the smaller shot drill sizes, which makes the lower limit for this equipment about 3½ in. It has been found recently that drilling a 5½ or 6-in. hole can be done about as fast as for a 3-in. hole. A 5-in. shot drill hole can be carried to a depth of about 2,500 ft., and a 12-in. hole to a depth of 600 ft. Shot drilling is particularly expensive in cavernous or seamed rock, because it is difficult to hold the shot.

Shot core drills are driven by steam, air, gasoline, or electricity and run in sizes from 1½ to 72 in. Large diameter cores up to 6 ft. may be driven by modern machines to a depth of 100 ft. The 4-ft. core can be run to a depth of about 200 ft. For these machines about 50-hp. motors are used.

While diamond drills are capable of drilling at almost any angle, shot drills are limited to a maximum angle of 45 deg. downward. Above this angle, the shot lies in the lower side of the hole and may run away.

Table 2 . . . Rock Drilling Costs and Performance

SIZE OF HOLE *Inches*	CLASS OF ROCK	JACKHAMMER Drilling Rate *Ft. per Hr.*	JACKHAMMER Cost $ *per Hr.*	WAGON DRILL Drilling Rate *Ft. per Hr.*	WAGON DRILL Cost $ *per Hr.*	DIAMOND CORE Drilling Rate *Ft. per Hr.*	DIAMOND CORE Cost $ *per Hr.*	SHOT DRILL CORE Drilling Rate *Ft. per Hr.*	SHOT DRILL CORE Cost $ *per Hr.*
SMALL HOLES									
1⅝ (Core 1⅛)	Soft to Medium	10—20	1.35	25—35	3.00	3—7	4.40		
	Hard	5—10		20—25		2—4	4.60		
2⅛ (Core 1⅝)	Soft to Medium	8—15	1.45	25—30	3.00				
	Hard	3—8		15—25					
3 (Core 2⅛)	Soft to Medium			10—15	3.25	3—5	5.40	1—3	3.10
	Hard			5—10		1—3	5.60	½—1¼	3.20
4 (Core 3)	Soft to Medium			5—10	3.50			1—2	
	Hard			3—5					
LARGE HOLES									
						WELL DRILL		SHOT DRILL CORE	
6 or 5½ with Core 4¾	Soft to Medium					3—6	2.50	¾—2½	3.10
	Hard					1—3	2.75	½—¾	3.20
12	Soft to Medium								
	Hard					1—4			
36	Soft to Medium							½—1	4.50
	Hard							¼—½	4.60

NOTES: Soft to Medium Rock — Varies from shale, soft limestone to siliceous limestone, and dolomite . . . Hard Rock — Includes trap, granite, quartz, chert, graywacke and quartzite . . . Drilling rates and costs shown are per shift or gross operating hour. All delays are included, such as for moving, repairs, hung steel, low water or air pressure, blowing holes, removing cores, etc. . . . Operating costs include all direct drilling charges covering operating labor, repairs, sharpening, bits, tools and supplies, compressed air, power, pipe casing, equipment depreciation, etc. No charges are included for general overhead and superintendence or insurance.

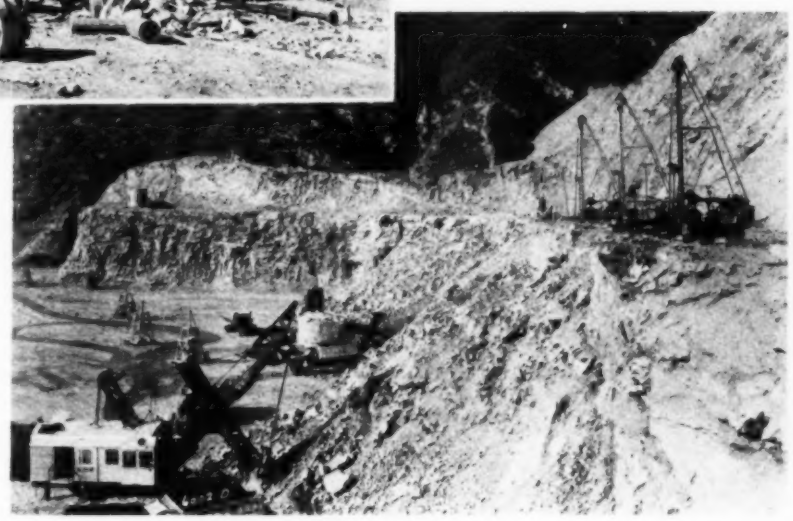
SHOT CORE-DRILL and 36-in. diameter cores from hole drilled for foundation exploration.

the core. Diamond drills are far superior to shot drills in seamy work. They can drill to a depth of 1,000 ft. or more and operate with core barrels 2 to 10 ft. long. Frequently bortz is used as a cutting medium in softer rock, although many drillers express a preference for diamonds, claiming that in all cases the longer life more than offsets the higher cost. The main advantage in the use of bortz is the lower investment in case a drill bit is lost.

Black diamonds cost about $40 per carat and require 7 to 8 stones of about 2 carats each for a 1½-in. hole. The diamond bits cost about $600. Bortz bits usually require 35 to 40 stones, sized from 2 to 7 stones per carat, and cost about $7.50 per carat, or $66 per bit. Bortz is sharper and harder than black diamond, but less tough and less durable. In hard graywacke at Hiwassee dam, containing 60 per cent silica, a bortz bit drilled from 40 to 80 ft. per bit. Diamonds or bortz are usually set by hand, although a recent process of casting the metal for the bit into a basket containing the stones in their desired distribution has resulted in substantial reduction of bit cost.

Shot Drills

For core holes of 3 in. and larger shot core drills are used with chilled steel shot as the abrasive material. The shot breaks under the bit and the resulting sharp angular particles are the cutting medium for breaking and grinding the rock under the bit and leaving



WELL DRILLS for putting down deep holes on large quarry operation.

Special Auger

For soft rock a special auger has recently been developed and used on several jobs, notably at Fort Peck dam for drilling 467 shafts 5 ft. in diameter and sunk 30 to 40 ft. through shale for later backfilling with concrete to develop supporting piles for the spillway structure. This auger consisted of a 50-ft. drive shaft, turned by a 40-hp. motor and suspended from a derrick. It was equipped with a 5-ft.-diameter cutter pan with special cutter teeth, and after each foot of penetration, the assembly was lifted out of the hole to dump the cuttings. Drilling was at a rate of 5-ft. per hour.

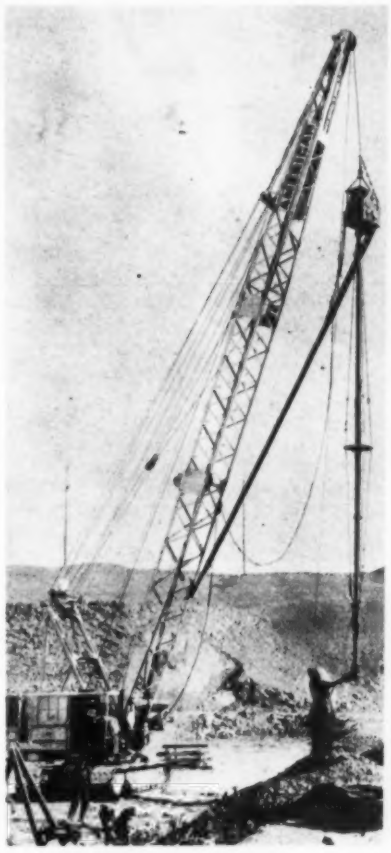
Drill Rods and Bits

Drill rods for hammer type drills come in standard sizes of ⅞ in. to 1½ in. in diameter, and in standard lengths up to 30 ft., with special lengths at times running to 40 and 60 ft. Rods are either hollow with round or hexagonal sections, or solid, with auger, octagonal, quarter-octagon or cruciform sections. Due to the wear on the bit gage, it is general practice to decrease the gage at regular intervals as the hole increases in depth. In limestone and dolomite this change made for each 10 ft. of depth usually amounts to ⅛-in. gage. A hole of 1¾-in. diameter is about the smallest that can be satisfactorily drilled to appreciable depth.

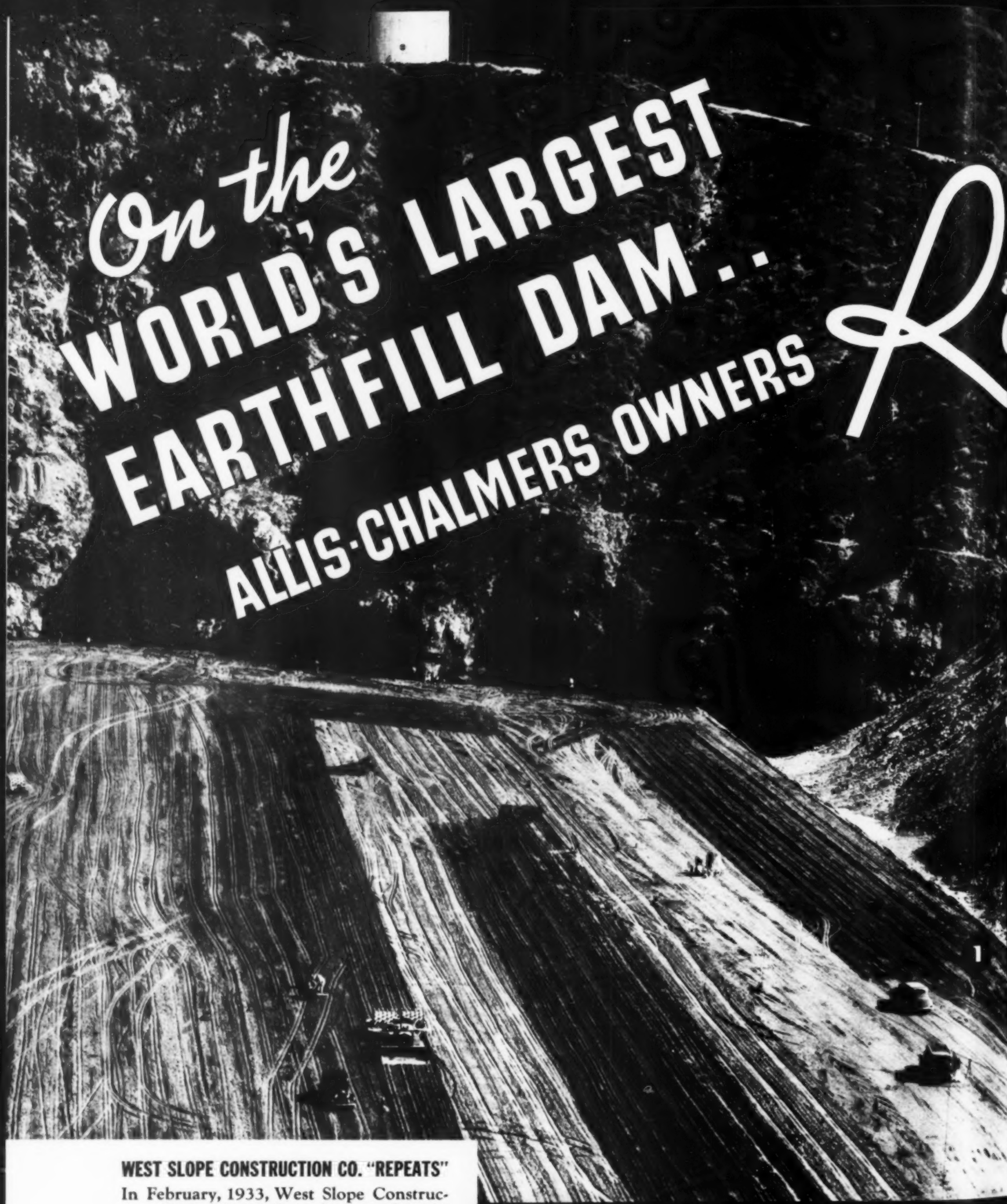
Drill bits are either of the detachable or forged type, and of the following standard shapes:

Chisel bits for very hard rocks.
Fishtail bits for very soft rocks.
Four-point cross bits for medium hard, powdery rock, such as limestone and dolomite.
Six-point cross bits for very soft rock or extremely hard but very brittle rock.

Standard bit gages vary from 1½ to



SPECIAL AUGER for drilling 5-ft. diameter holes through shale at Fort Peck Dam.



WEST SLOPE CONSTRUCTION CO. "REPEATS"

In February, 1933, West Slope Construction Co. ordered their first model "L" Tractor. Since then, they have purchased 13 Model "L's," 7 Model "L-O" Oil Tractors, a Model "K" and 4 Speed Patrols—a tribute to the satisfactory performance of Allis-Chalmers equipment on San Gabriel Dam No. 1.

ALLIS-CHALMERS

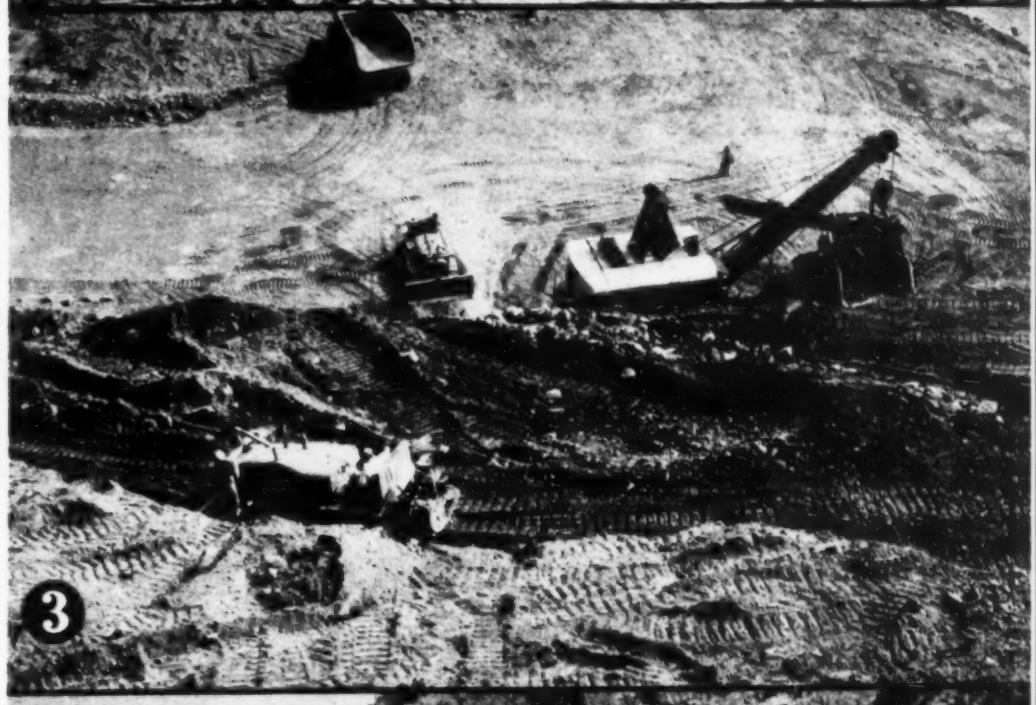
TRACTOR DIVISION—MILWAUKEE, U. S. A.

Repeat

One of the most spectacular efforts of man to control the destructive forces of nature is San Gabriel Dam No. 1, near Los Angeles. This mammoth structure necessitates the blasting, quarrying, removing and placing of 10,809,000 cu. yds. of rock and earthfill . . . will tower 375 ft. above bedrock, with a crest length of 1,540 ft., and a base width of 1,950 ft. Scheduled for completion in June, 1938, it will be the largest, highest dam of its type in the world.

Working against time and the elements, with reliable performance of equipment and big output absolutely essential . . . West Slope Construction Co. selected a fleet of Allis-Chalmers Tractors and Speed Patrols. Photo No. **1** shows a general view of the fill, with a Model "L-O" Oil Tractor and sheep's foot roller in the foreground. In No. **2** and No. **3**, other "L-O's" are shown bulldozing material down the west slope of the canyon for loading by shovel into trucks. No. **4** shows an A-C Speed Patrol grading and leveling the fill where trucks have been dumped.

On jobs large and small, Allis-Chalmers Tractors not only make more trips per hour but give the kind of dependable performance that leads to "CHEAPER PER YARD" dirt moving. That is why Allis-Chalmers owners "repeat".



Controlled Ignition OIL TRACTORS

3¼ in. by ⅛ in. Special detachable bits of 3½ in. to 4¼ in. are also available.

One of the most important elements in sharpening bits is the proper heat treatment of the steel to overcome brittleness and fatigue. The rods are subjected to very high stresses, and improper sharpening and heat treatment result in quick failure. When forging the bits or shanks the rods are now almost universally heated in oil furnaces, some of them equipped with automatic control of temperature. A further automatic machine is obtainable for quenching the rods in oil in order to obtain a uniform temper. A standard drill sharpening shop consists of sharpeners, shank and bit punches, a grinder and a shank grinder to square up the ends of rods.

Detachable Bits

The use of detachable bits in place of forged bits is growing rapidly, particularly on work where the handling of drill steel to and from the sharpening shop is an appreciable item. In general, detachable bits have a better metallurgical composition and temper than is obtainable in the field with forged bits. A comprehensive test on various types of detachable bits and forged bits was made on the Norris dam quarry over a period of four months. The accompanying table describes some of the more general results from these tests and indicates a somewhat lower drilling cost with detachable bits on this quarry:

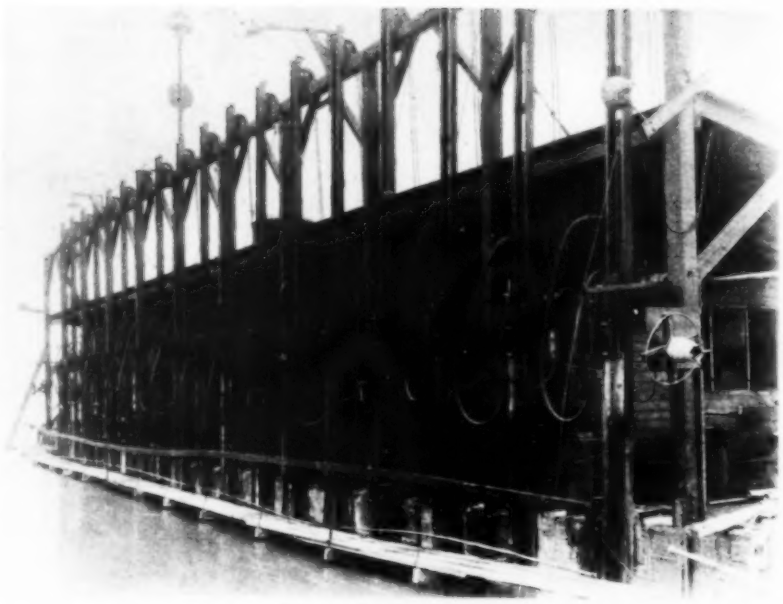
RESULTS OF DRILL BIT TESTS

	Detachable Bits	Forged Bits
Lin.ft. drilled per cu.yd.of rock	.599	.848
Lb. rod metal consumed per yard	.06	.051
Lb. rod metal consumed per 1,000 ft. of drilling	100.9	60.1
Drilling rate, ft. per hour	32.80	28.26
Drilling ft. per fresh point	11.63	10.32
Total cost per ft. of drilling (operation, shop, nipping and material costs)	11.79	12.25

Blasting

A variety of explosives is available to meet particular requirements with respect to velocity of explosion, strength of blow, intensity of fumes, inflammability and resistance to water and cold. The nature of the blasting requirements and layout of holes must be related to the proper selection of explosives. A slow, confined explosion produces an even blow; fast explosions give a shattering blow.

An essential part of a dynamite charge is the blasting cap or detonator, which is charged with a powerful explosive and either fired by a safety fuse or electric spark. The resulting shock and intense heat fires or detonates the dynamite. Electric caps are normally used on modern construction work, and the standard caps are insulated against water but are not waterproof for under-water firing. The caps are equipped with wires from 4 to 20 ft. long, varying in 2-ft. increments, and are interconnected through a parallel or series circuit for firing from an electric source. Series circuits are usually fired by blasting machines, but with parallel circuits, connection to a power supply is the usual practice. As a safety precaution, circuits are tested with a galvanometer before firing. Electric delay caps are designed for successive firing up to six intervals, after receiving the initial firing impulse. A representative layout of a blast as employed on the Norris dam quarry, using the bench method, consisted of one, two, or three rows of holes about 8 ft. from the face and 8 ft. apart, all parallel to the face. In each row the holes were 30 ft. deep and 6 ft. on centers, and the explosives were distributed in the holes to break up the rock as much as possible and reduce the need for secondary shooting.



DRILL BOAT for under-water drilling on channel deepening project.

DRILLING AND EXPLOSIVES PER CU.YD. OF ROCK

Project	Type of Rock	Type of Excavation	Explosives Required, Lb. Per Cubic Yard of Rock Excavated	Lin. Ft. of Hole Req'd., Ft. Per Cubic Yard of Rock Excavated
Wheeler dam[1]	Limestone	Power house foundation	.500	1.03
		Dam foundation	.628	1.63
Norris dam[1]	Dolomite	Open quarry	.692	.84
Pickwick[1]	Limestone	Lock foundation	.671	2.32
Landing dam		Power house foundation	.650	1.59
Guntersville dam[1]	Limestone	Lock foundation	.403	2.95
Chickamauga dam[2]	Limestone	Lock foundation	.439	.356
		Open quarry	.435	.506

[1]Holes drilled with 2½-in. bits. [2]Holes drilled with 4½-in. bits.

DETACHABLE DRILL BITS of three representative makes. Left, Ingersoll-Rand; center, Crusca; right, Timken.

OIL-BURNING FORGE and drill-sharpener for forging bits on drill steel.

On foundation work for dams special precautions are required to prevent shattering of the base. As a rule, the bulk of the rock to be excavated is blasted with heavier charges and this is followed by lighter blasting as the final grade is approached.

At Wheeler dam the deep excavation for the draft tubes required special care in not disturbing the adjacent foundation for the intake structure. The cut was made by line drilling a vertical face with 2¼-in. holes at 4½-in. centers. The rock to be excavated was then drilled with 6 to 8-ft. deep holes with the space between holes equal to two-thirds of the depth. All of these holes were located outside of a 30-ft. wide zone adjacent to the line drilling, and this zone was not drilled. The shattering effect of the other holes was depended upon to break up the rock in this zone, and this arrangement plus the line drilling prevented destructive shocks from being transmitted into the foundation for the intake structure.

An accompanying table shows the amount of drilling and explosives per cubic yard of rock excavation as experienced on a number of large projects.

A great many standard precautions have been developed on most jobs for the handling of explosives. These include protection from sparks and rain while hauling, avoiding shocks, storing in a dry, well ventilated place at a safe distance from other buildings, and particularly the hauling of detonators and explosives in separate vehicles and their storage in different buildings.

❖

NEXT MONTH — Chapter 18 of the series on "Heavy Construction," by A. J. Ackerman and C. H. Locher, to appear in the June issue, will discuss "Grouting, Special Foundations and Caissons of Various Types."

Present and Accounted For

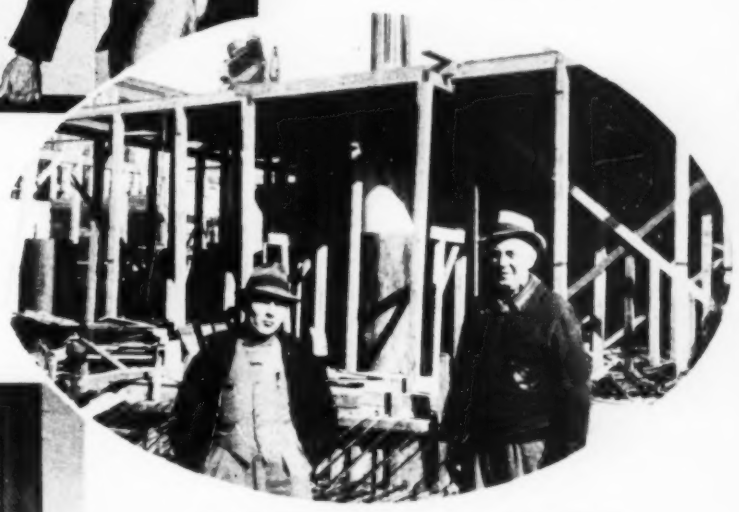
A PAGE OF Personalities

CONTRACTOR GREETS "AQUABELLE"

SAM W. EMERSON, president, Sam W. Emerson Co., general contractor, of Cleveland, Ohio, and member of Executive Committee of Cleveland's 1937 Great Lakes Exposition, extends welcome to ELEANOR HOLM JARRETT, swimming champion and former member of U. S. Olympic teams, who will be star "aquabelle" of Exposition's swimming spectacle "Aquacade," highlight entertainment feature.

CRAFTSMANSHIP REWARDED

Upon completion by Hegeman Harris Co., Inc., general contractor, of new building for Dry Dock Savings Bank at Lexington Ave. and 59th St., New York City, New York Building Congress awards certificates of craftsmanship to selected construction personnel. On platform, bestowing awards, are *(left to right)* THOMAS S. HOLDEN, president, J. P. H. PERRY, of Turner Construction Co., chairman, Committee of Award, New York Building Congress and ANDREW MILLS, JR., president of Dry Dock Savings Bank. Receiving certificates are: *(left to right):* CURTIS SANNERS, mechanic; CHARLES NAHLICK, painter; MATTHEW MURDY, plumber; JOHN STRITZEL, plumber's helper; WILLIAM ENRIGHT, steamfitter; FRED WATSON, steamfitter's helper.



WAREHOUSE CONSTRUCTION

for Federal Printing office in Washington, D. C., is being supervised for Charles H. Tompkins Co., general contractor, by F. M. TOMPKINS (left) general superintendent for company and I. W. ROBEY, job superintendent.

CONSTRUCTION CLIFF DWELLER

JAMES G. DAVISON is superintendent for Francis A. Canuso & Son, general contractor of Philadelphia, on construction of new $2,300,000 sewage disposal plant at Niagara Falls, N. Y. New plant is being built about 200 ft. below top of 574-ft. cliff along Great Gorge from which all material must be lowered to place.

CONCRETE CONTRACTORS

will operate this year under leadership of DANIEL F. SERVEY, of Haydite Corp., Kansas City, Mo., who has been elected president of National Concrete Masonry Association, with which has recently been merged National Cinder Concrete Products Association.

KENSINGTON HIGH SCHOOL

at Buffalo, N. Y., is being completed under field direction of T. M. Boyne *(left)*, general superintendent for R. E. Williams & Sons, Inc., contractors, of Buffalo.

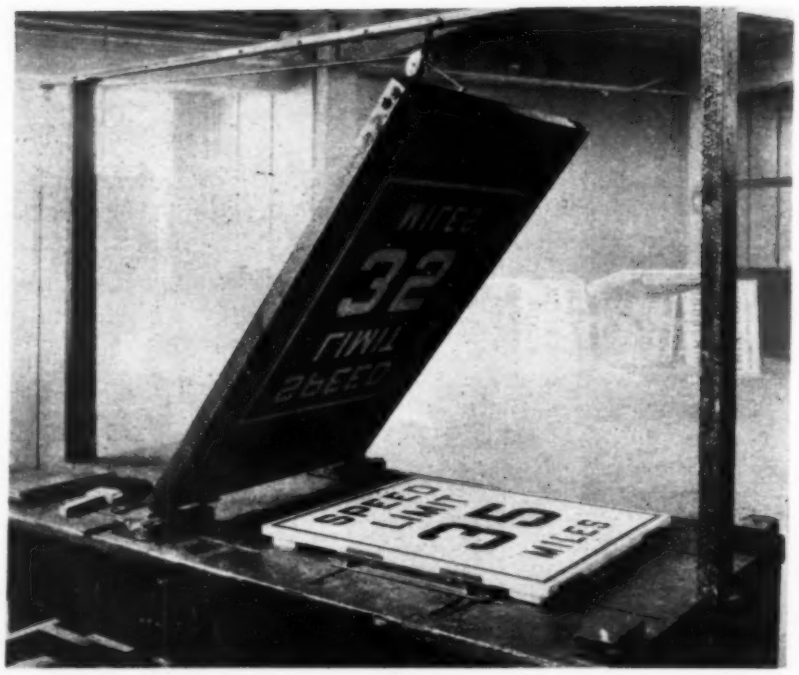
Signs for Highway Marking as Ohio Makes Them

THE FOLLOWING DISCUSSION, based on experience in organizing and directing the marking of the state highway system in Ohio, is from a paper by Harry E. Neal, traffic engineer, state highway department of Ohio, presented at the annual meeting in February of the Association of Highway Officials of the North Atlantic States.

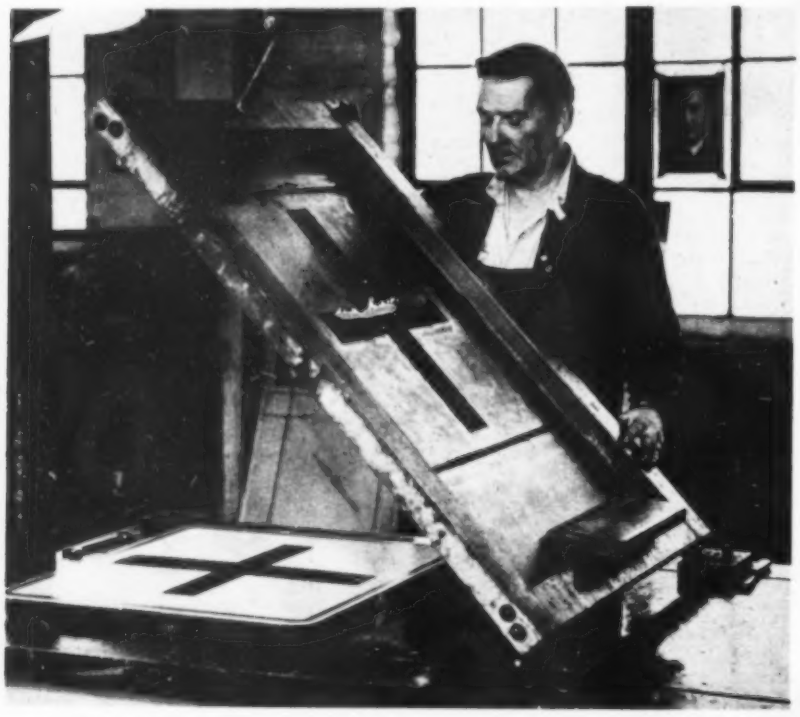
In Ohio, supervision of the erection of all signs and markers on state highways is one of the functions of the Traffic Division of the state highway department. The field work of erecting signs and markers, painting center lines and lane lines on pavements is in charge of a route-marking superintendent in each of the state's 12 highway districts. The route marking superintendent is responsible to the division engineer.

In the interest of uniformity for the country as a whole, all states should conform in general to the standard designs for signs adopted by the American Association of State Highway Officials.

The Traffic Division operates a modern sign-painting plant at Columbus, housed in a building, 80x200 ft., built for that purpose. Most of the signs are made on flat steel, the only embossed signs used being the route markers, both US and Ohio, the railroad signs, and the Stop signs. It has been found more economical to use flat sheets for most signs, as flat sheets have a higher salvage value than embossed signs. Flat sheets, even though shot or otherwise damaged, can be utilized for cutting out sheets for smaller signs. An embossed sign which has holes shot in it or which has been bent must be thrown away as it cannot be satisfactorily straightened and it is not possible to cut from it any considerable area of flat metal. Another advantage in the use of flat signs is the ease and economy with which changes in the legends or symbols can be met. With flat signs it is necessary only to remove the old finish and repaint the signs with the new design.



SILK SCREEN STENCIL, mounted on hinged frame, through which paint for legend is applied by rubber squeegee.



TOP VIEW of silk screen stencil, showing rubber squeegee for applying paint.

For several years commercial flat, black sheets were used for all signs. It was found difficult, however, to maintain the signs and markers in good condition, due to the difficulty of keeping them from rusting. When refinishing the black steel signs it was found necessary to remove the rust by wire brushing, a costly operation.

After exhaustive tests a special zinc-coated commercial sheet, which is heat-treated after galvanizing to produce a surface texture to which paint and enamel will adhere, was adopted. This has proved to be highly rust-resistant and retains paint or baked enamel satisfactorily. The zinc-coated steel is used for all signs, whether flat or embossed. There are several good grades of this sheet on the market all of which will stand embossing without serious damage to the zinc coating and which have excellent paint and enamel adherent qualities.

One of the most important steps in the application of paint or enamel to the zinc-coated steel is to make sure that the surface is free from grease or oil before application of the finish. Grease or oil on the surface of the

PAINT STRIPPING and rinsing tanks at Traffic Division's sign-painting plant.

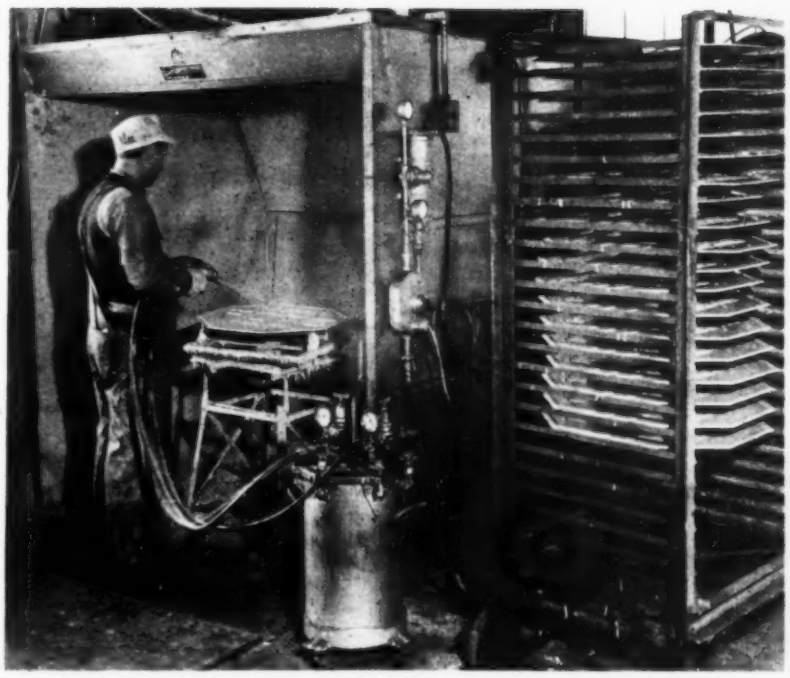
metal will cause the paint or enamel to peel or flake off within a relatively short time. Each sheet should be cleaned with a solvent such as gasoline, varnolene, naphtha or turpentine before painting. After cleaning, the steel is given an undercoat of baking enamel by dipping, and after baking it receives a finish coat which is sprayed. In the white enamel the undercoat is the same as the finish coat. The undercoat for the yellow baking enamel used, however, is not the same as the yellow finish coat. Long oil varnish baking enamels, with a semi-gloss or egg-shell finish, are used. This type of finish has proved satisfactory and for that reason lacquers or synthetic resin enamels have not been used, although the possibility of the use of these finishes has been considered.

The white enamel used is of the chalking type, with a semi-gloss or egg-shell finish. This type of enamel slowly wears away, keeping the finish clean and white. Non-chalking high gloss enamels have a tendency to assume a decidedly yellowish cast upon exposure to weather and do not have the self-cleaning characteristics of the chalking enamels. Each coat of white enamel is oven baked at 175 deg. F. for 2 hr.

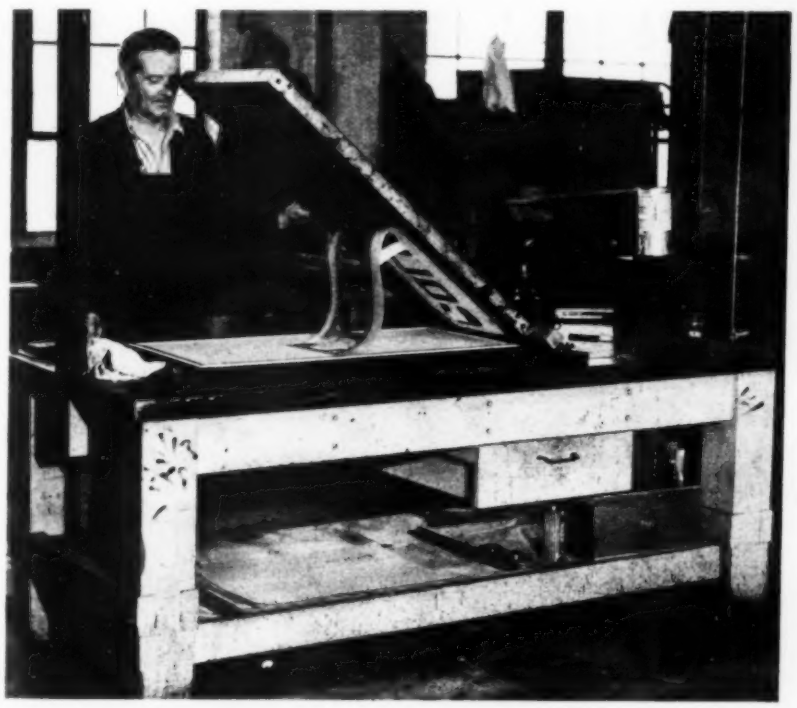
The primer or undercoat for the yellow enamel is a flat coat designed for application by dipping. It is oven baked for 2 hr. at 200 deg. F. The yellow finish coat is of the non-chalking, egg-shell finish type designed for spray application. It is oven baked for 2½ hr. at 200 deg. F.

Silk Screen Process — On all unembossed signs the legend or face design is applied by the silk screen process. The design is blocked out on a diaphragm of silk bolting cloth tightly stretched over a wooden frame. The legend or symbol, together with the border, is left open and the remainder of the silk is covered with a special lacquer or filler. In use, this screen or stencil is placed flat upon the blank sign and the design is transferred to the face of the sign by forcing semi-paste black through the open mesh of the design on the silk by a rubber squeegee. This process is very rapid and the cost of stenciling the signs is correspondingly low. The cost of making a silk screen varies from $25 to $35, depending upon the amount of detail in the design. For this reason it is not economical to make a silk screen when only a few signs of one kind are required.

When the number of signs of each kind is small, as in the case of city or town name signs, direction and distance signs, a combination of the paper stencil and silk screen method is used. A paper stencil is cut using an oiled tympan paper of 0.0045-in. thickness. The paper stencil is placed directly on the sign blank and an open or blank silk screen is placed over this. The paint is then squeegeed through the silk and through the paper stencil on to the sign. Of course, with this method, it is necessary to cut in by hand the ties of the paper stencil. All black designs, whether applied by silk screen or by the coating machine, are oven-baked at 175 deg. F. for 2 hr.



PAINT SPRAY is applied to sign by operator in finishing booth.



PAPER STENCIL used in combination with silk screen for signs of which small number is needed.

Reflector Units — One of the greatest advances in highway marking in recent years has been the development of reflector units or buttons for making signs luminous under the rays from headlights at night. The Ohio Highway Department makes extensive use of button signs. The method preferred is that of reflectorizing the legends and symbols rather than reflectorizing the border only, as is recommended in the Manual on Uniform Traffic Control Devices. The faces of the signs are made from new sheet metal and the housings on the backs are made from salvaged signs. These housings are fabricated by cutting the metal to size and shape on a shear and bending on a brake.

In the rural areas steel drive posts are used for all signs and markers except the signs giving directions and distances, which are mounted on wood posts. In cities and towns, markers and signs are attached to lighting standards, trolley poles, etc. by special metal brackets. All posts and brackets are painted at least once a year.

The first step in the refinishing process is the removal of the old finish by immersion in a tank containing a hot solution of sodium-silico-aluminate. The detergent compounds ordinarily used for stripping paint cannot be safely used in stripping the finish from the zinc-coated metal, as they attack and destroy the zinc. After the old finish is removed the signs are rinsed and dried and are ready for refinishing. The zinc-coated steel can be cleaned and refinished an indefinite number of times without losing its rust resistant qualities. Although the cost of this type of zinc-coated sheet metal is approximately 60 per cent greater than the cost of the black metal, its advantages make it more economical over a period of time. Due to their rust-resistant qualities the signs require refinishing at much less frequent intervals. Also, when refinishing is necessary, there is no costly rust removal problem.

A central authority should plan and direct the marking of the state highway system if the marking is to be efficiently done and properly maintained.

CRATING FINISHED SIGNS preparatory to shipment to location or to division headquarters for storage.

Construction Equipment News

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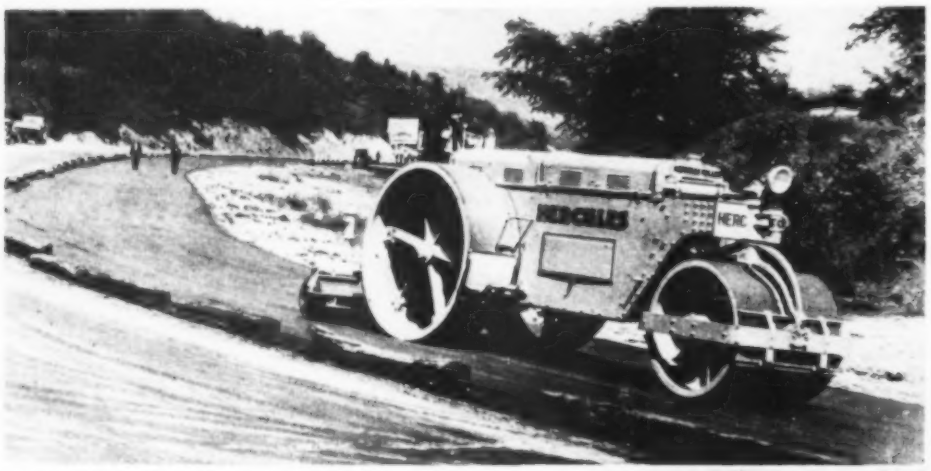
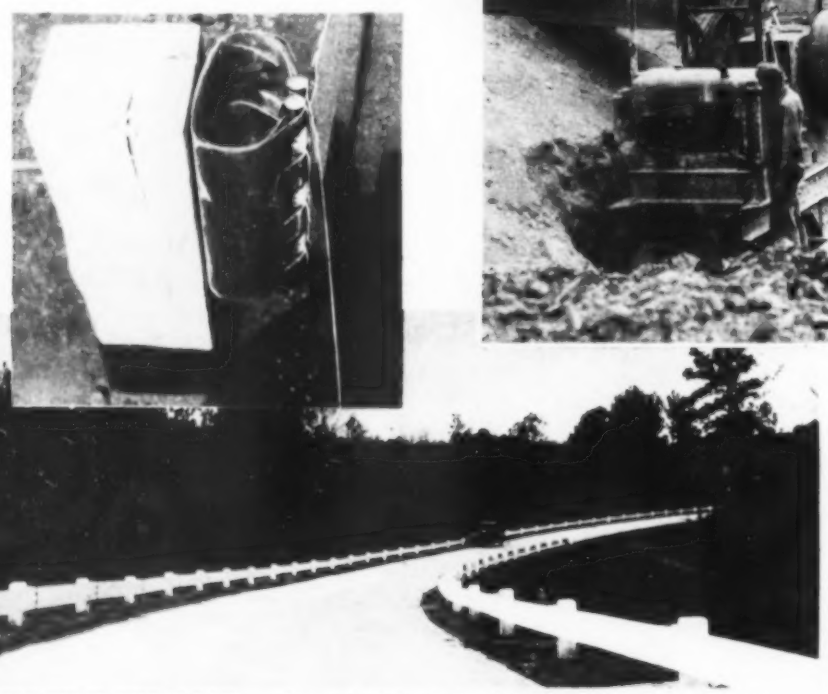
Review of Construction Machinery and Materials for May, 1937

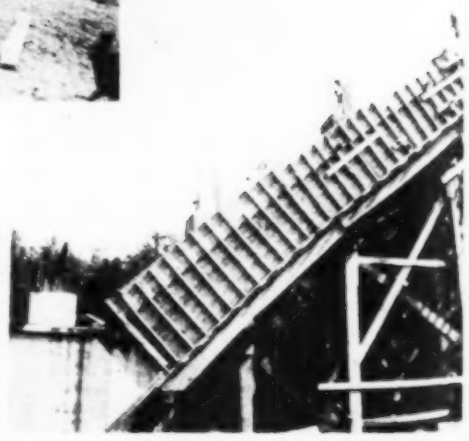


AUXILIARY SMALL-DIAMETER ROLL. hydraulically controlled, mounted on rear of large roller, distributes material before compaction and then compresses it with lasting seal into smooth level plane making possible wider use of low-cost types of surfacing. Feature of troner roll is equalizer which automatically maintains predetermined hydraulic pressure (range, 0 to 300 lb.) on roll at rate best suited to work and, when high spot is encountered, prevents wheels from slipping by restoring traction immediately. Said to eliminate necessity of cross-rolling and of use of tandem rollers in certain kinds of work. May be obtained in any width up to full rolling width of machine. — **The Hercules Co., Marion, Ohio.**

C.E.P. PLANT (Crusher, Elevator, Power) **(below)** is basic unit for different crusher set-ups to be used independently or in conjunction with other equipment. Any type of crusher may be employed, giving operators wide range of capacities. Stone is fed to crusher jaws, reduced to proper size and spouted directly to bucket elevator available in lengths from 20 to 33 ft. (from center of lower drum to center of head drum). Both crusher and elevator driven from one power source. Power units supplied with fuel tank, air and lubricating oil filters and mufflers. Folding-type elevator long enough to load directly into trucks, bin or screen mounted on bin. Mounted on high- and low-type trucks. — **Austin-Western Road Machinery Co., Aurora, Ill.**

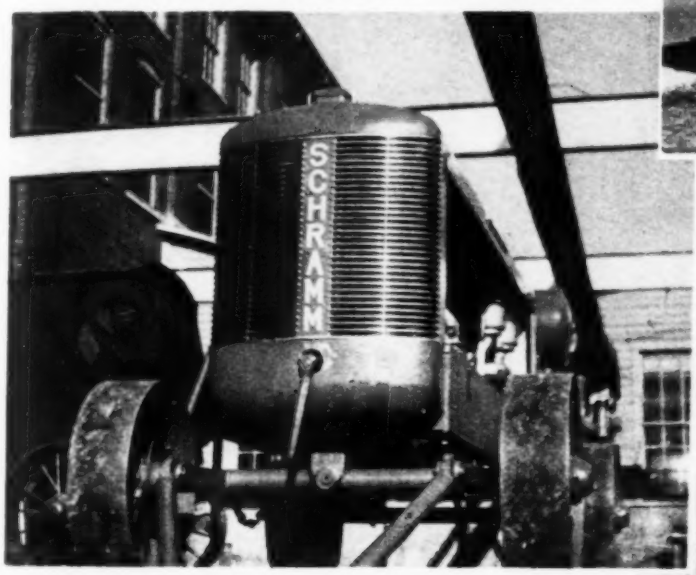


FLEXIBLE STEEL GUARD RAIL employs principle of absorbing shock of initial impacts and then diverting vehicle against self-adjusting resilient surface along straight course until driver regains control. Consists of hot-dip galvanized steel panels, 12 in. wide and 16 ft. long, attached to three-leafed galvanized steel spring offset brackets which are, in turn, supported by posts of plain or treated timber, of reinforced concrete or of steel. After installation, only face of Resiflex road guard needs painting for maximum visibility as galvanized steel does not require paint for protective purposes. Most contacts make necessary only realignment of posts and repainting of scratched rail surfaces, but should replacement of parts be required, work can be done with minimum of expense and trouble. — **National Traffic Guard Co., 237 Fourth Ave., Pittsburgh, Pa.**



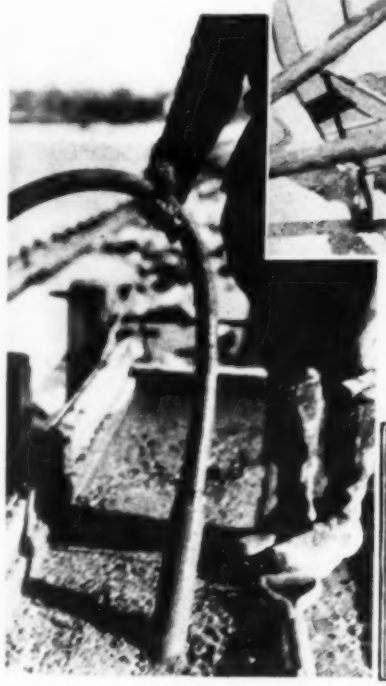
CONTROLLABLE BOTTOM-DUMP BUCKET (right) in 18-, 33- and 63-cu.ft. capacities enables operator to regulate flow of concrete with one hand. Single radial gate, easily opened or closed regardless of amount of concrete still in bucket, makes clean cutoff, allowing no mortar or concrete to drip. Hand-lever power multiplied twenty times when opening gate and reduced after gate is partly open. Bucket may be used as floor hopper to load buggies, wheelbarrows or for discharging into chutes. May be rolled from place to place by one man. Few moving and wearing parts and only two pins. Can pour into narrow forms and columns. Larger capacity buckets to order. — **Wiley Equipment, Lancaster, Pa.**

AIR COMPRESSOR of improved design **(below)** cuts trucking and transportation costs for contractor by use of smaller and lighter pistons for operation at increased speed, making possible weight reduction of 1,500 to 5,000 lb. Other features of Utility models: (1) New type of mechanical intake valve operated from camshaft in perfect timing with piston travel; (2) main bearings intersperse every cylinder; (3) forced-feed lubrication to all main connecting-rod bearings. Gasoline-powered sizes offer air deliveries of 85, 105, 160, 210, and 315 cu.ft. per minute. Diesel-powered sizes include 105-, 160-, 210-, 315- and 420-cu. ft. ratings. — **Schramm, Inc., West Chester, Pa.**



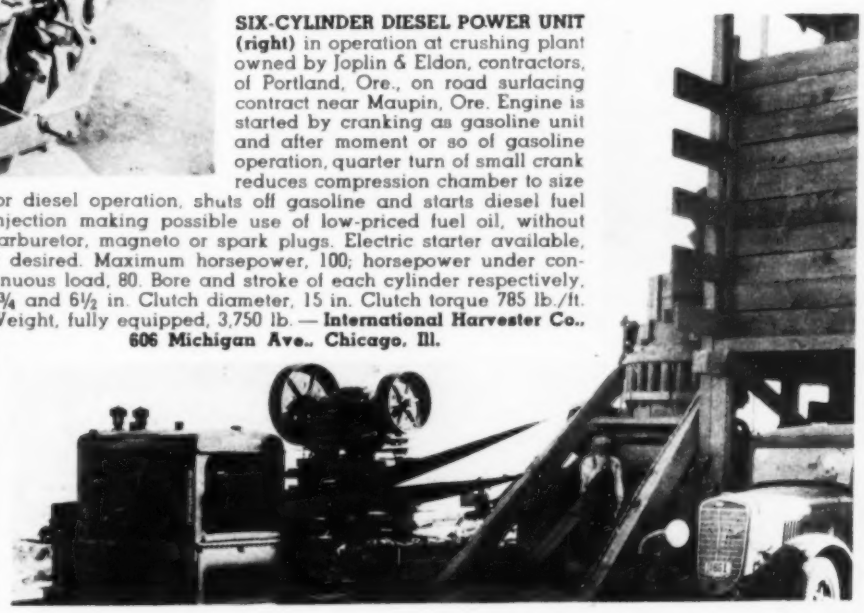
THREE-AXLE TANDEM ROLLER embodies principle of automatic transfer of weight in rolling materials properly immediately upon being laid. Extension frame, consisting of two heavy steel channels, is riveted to cast steel king-pin housing and securely bolted to heavy steel main frame at three points to maintain all three rolls on absolute plane. Heavy steel plate steering rolls are made watertight when specified to obtain extra compression. Ball-bearing hubs take radial and thrust loads. Steering rolls connected by radius rod and operated by power steering. Drive roll has one-piece hub fitted at each end with heavy bronze bearing for revolving on stationary 4-in. axle clamped at each end in axle brackets attached to frame channels. All rolls accurately machined to form smooth, cylindrical surface. Roller equipped with sprinkler system and mats for all rolls. Transmission fully equipped with anti-friction bearings. All gears machine cut. Disk-type clutches control direction of travel through movement of one lever. Steering rolls, 48x54 in.; drive roll, 60x54 in. Horsepower at 1,050 r.p.m., 50. Weight, net working, 25,900 lb.; full loaded, 36,760 lb. — **Buffalo-Springfield Roller Co., Springfield, Ohio.**

HYDRAULIC INTERNAL VIBRATOR (below), called "Hydro-Spade," for spading joints and side forms in paving construction, is designed to withstand severe action of extreme frequencies. Vibrator unit, 2¾ in. in diameter, 21 in. long and weighing 20 lb., is driven by small-vane-type turbine motor and operates at frequency of 6,000 to 7,500 r.p.m. Turbine, in turn, is driven by light-bodied lubricating oil continuously circulating at 20 g.p.m. under 150-lb. pressure and supplied by small geared pump direct connected to 3½-hp. air-cooled engine **(right).** Power unit weight, complete with pneumatic wheel, 200 lb. Hose handle, of oil-resisting rubber and chord construction, is 34 ft. long and 1⅞ in. in diameter.— **Electric Tamper & Equipment Co., Ludington, Mich.**



TRACTOR-TRAILER COMBINATION, for handling sand and other materials in locations where added traction is necessary, consists of high-speed, four-wheel drive air-power steer tractor with semi-trailer attached. Carries 15 yd. per load and travels at speeds up to 35 m.p.h. Feature is air-power steer on all four wheels, enabling entire unit to turn within 31½-ft. circle. Equipped with six 18x24-in. balloon tires. Trailer hitch located near center of tractor and distributes traction to all four wheels. Power applied to all wheels regardless of angle. — **Oshkosh Motor Truck Co., Oshkosh, Wis.**

SIX-CYLINDER DIESEL POWER UNIT (right) in operation at crushing plant owned by Joplin & Eldon, contractors, of Portland, Ore., on road surfacing contract near Maupin, Ore. Engine is started by cranking as gasoline unit and after moment or so of gasoline operation, quarter turn of small crank reduces compression chamber to size for diesel operation, shuts off gasoline and starts diesel fuel injection making possible use of low-priced fuel oil, without carburetor, magneto or spark plugs. Electric starter available, if desired. Maximum horsepower, 100; horsepower under continuous load, 80. Bore and stroke of each cylinder respectively, 4¾ and 6½ in. Clutch diameter, 15 in. Clutch torque 785 lb./ft. Weight, fully equipped, 3,750 lb. — **International Harvester Co., 606 Michigan Ave., Chicago, Ill.**



Further Information

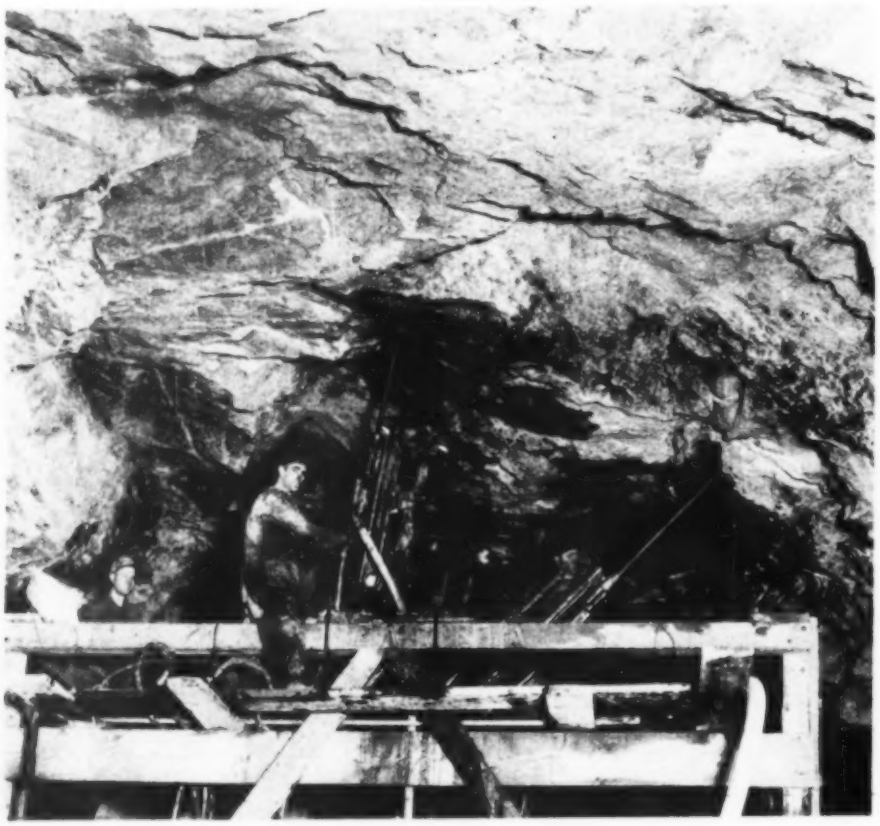
Requests for further information should be sent to:

The Editor,
CONSTRUCTION
Methods and Equipment
330 West 42nd Street
New York, N. Y.

Construction Equipment News

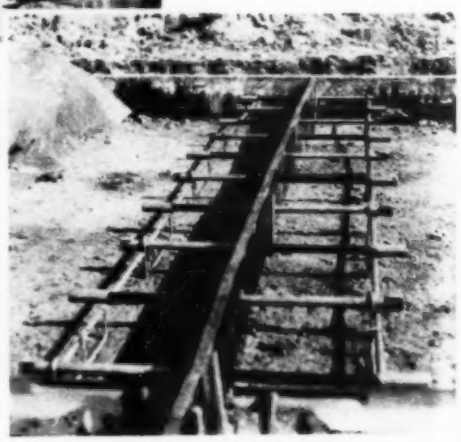
(Continued)

REMOVABLE ROCK BITS for use in mine and tunnel drilling are made of die-forged steel under closely controlled temperature conditions to prevent burning and cracking. Heat-treated, hardened and accurately machined so that cutting edges are square with shank of hollow drill steel. Shoulder construction permits hammer blows to be transmitted directly to solid body of bit instead of through threads, thus assuring more uniform distribution of blows, increasing drilling speed and preventing injury to threads. Easily applied and removed. Bit gages as follows: Cross bits, center- and side-hole, 1¼-2⅝ in.; center hole, (heavy duty), 1¾-3 in.; center hole chisel, 1⅜-2⅝; center- and side-hole rose, 1⅜-2⅜ in.—**Timken Roller Bearing Co., Canton, Ohio.**

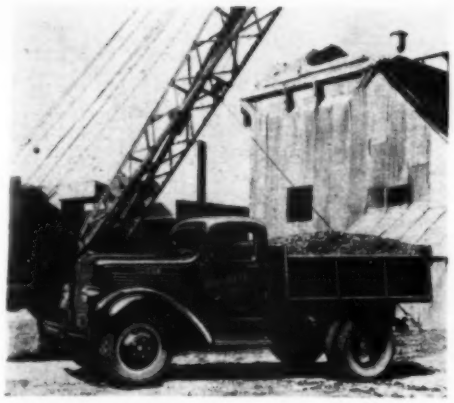


PORTABLE A.C. GENERATING PLANTS of 350- to 1,000-watt capacities have been restyled to reduce weight and dimensions. New features: (1) Plant may be serviced entirely from exhaust side enabling installation in close quarters; (2) welded all-steel generator with special cooling; (3) ball-type outboard bearings; (4) vacuum crank case ventilation; wide range temperature; (5) starting with thermal control; (6) standard motor-car engine accessories, such as carburetor, ignition and gasoline pump; (7) auto-type battery with remote control for self-cranking. Models are streamlined, fully inclosed. Operate on gasoline generating a.c. electricity.—**D. W. Onan & Sons, 43-51 Royalston Ave., Minneapolis, Minn.**

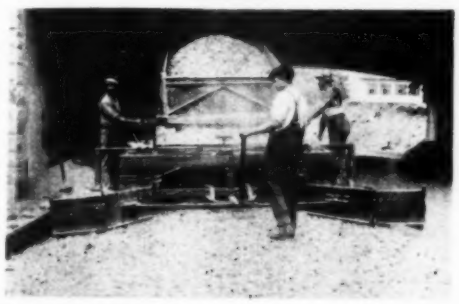
DAY AND NIGHT ROAD MARKERS (above and right), designed to reduce accidents by keeping motorists at all times conscious of curves, hilltops and other danger spots on highway. One type consists of yellow flat rubber blade or signal 2½ in. wide by 4 in. high projecting vertically from steel casting base embedded in pavement. Other consists of cast-steel base held flush upon pavement by two anchors and crucible bronze blade 4 in. wide and 3¾ in. high. When vehicles pass over these blades they are flattened to pavement, returning to vertical position after passage of wheels. As blades are yellow they assure high visibility in daytime and patented reflectors securely embedded in face of blade pick up headlight rays, increasing visibility at night. Unharmed by traffic or weather and can do no damage to vehicles. Weight 10 lb. each.—**National Traffic Appliance Co., Cleveland, Ohio.**



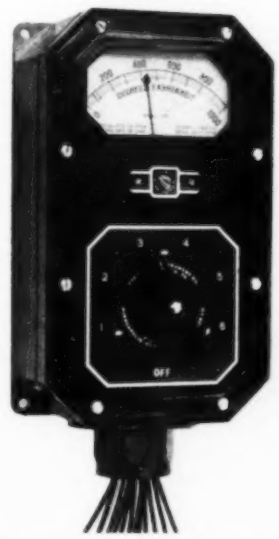
WELDED DOWEL SPACERS (above and right), for alignment and support of dowels through expansion and contraction joints in concrete highway slabs, combine distribution bars, dowel supports and expansion sleeves into one unit. Wire supports are formed to fit subgrade with loops to engage dowels and integral bar stops to prevent longitudinal slipping. Sleeves of not less than No. 14 gage wall thickness have collapsible end spacers for free working of joint. Chairs and sleeves are welded to distribution bars on exact height and spacing. Two spacers, one right and one left, required for each 10-ft. transverse joint. Completed assembly (above) handled without risk of ruining dowel alignment. Spacers remain in place insuring correct location during concrete placing and finishing. Dowels are aligned near ends where maximum accuracy is obtained and are not affected by tilting joints.—**Laclede Steel Co., St. Louis, Mo.**



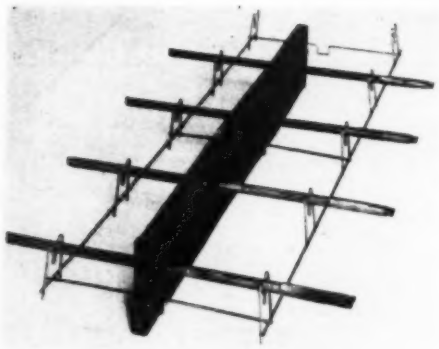
2-TON DUMP TRUCK built to stand up under severe conditions encountered in excavating and general contracting fields. Has gross weight rating of 13,500 lb. and is available in wheelbase lengths of 133, 148, 159 and 177 in. Engine has 3⅜-in. bore, 4½-in. stroke and piston displacement of 241.5 cu.in., developing 175 ft.-lb. torque and 85 hp. Heavy-duty, 11-in. clutch with torsional damper has self-lubricating ball-bearing clutch release. Full-floating rear axle in ratios of 5.125 to 1 and 6.33 to 1. Booster-operated hydraulic brakes 16 in. in diameter and 2½ in. wide. Box-type front cross member and X-type rear spring rear member assure stronger frame. Other improvements: (1) Two-bearing design water pump; (2) outside gas lines; (3) spring-cushioned parking brakes; (4) newly designed instrument panel and instruments; (5) cab redesigned for increased comfort and attractiveness. — **Dodge Division, Chrysler Corp., Detroit, Mich.**



FINISH SPREADER handles and spreads all types of road stone, slag, gravel and cinders. Use eliminates need of grader and avoids waste of materials and overrun. Advantages: (1) Simplicity of design — no engine, few moving parts, low maintenance costs; (2) accuracy assured by long guide rails which span small irregularities in subgrade. Manufacturers claim spreader will shape any crown or bank. Contour can be changed while machine is in motion. Spreading width variable and easily adjusted up to 11 ft. Material can be laid to curb. — **Foote Co., Inc., Nunda, N. Y.**

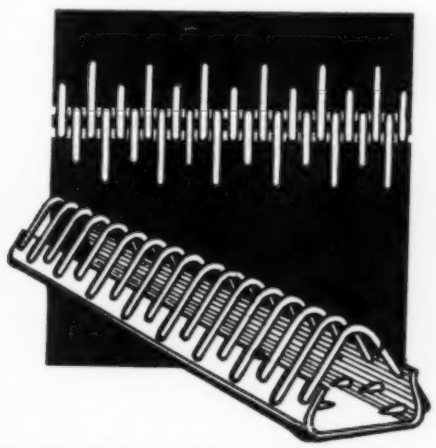


PYROMETER, designed especially for determining exhaust temperatures of diesel engines, is available in three temperature ranges: 0-1,000, 0-1,200, and 0-1,600 deg. F. and in switch-point combinations of 4, 6, 8, 12, 16 or 24. The 0-1,000 deg. instrument is also available with cold, normal and danger operating zones plainly indicated on scale. Features: (1) Ruggedly built for resisting vibration; (2) highly sensitive measuring system with special neutralizer having negative temperature coefficient; (3) lightweight case of molded bakelite, of permanent finish and waterproof; (4) dial-type switch mounted in separate compartment of pyrometer case enables operator to select temperature indications conveniently; (5) enameled metal scale. Each pyrometer calibrated within 1 per cent of full range in normal operating zone and 2 per cent outside that zone. — **Brown Instrument Co., Philadelphia, Pa.**

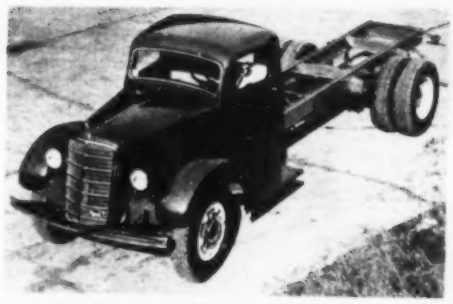


CONTINUOUS SPACER AND SUPPORT for dowel bar assemblies in concrete pavement enables contractor to assemble and quickly place expansion joint, dowel bars, spacer bars and dowel bar sockets alongside of road. Spacer bar is set in projection of dowel chair and snap-in device securely locks both in correct position without additional wiring, so that they cannot be dislodged during concreting. Cross-bar is recessed to receive joint and keep it in perfect alignment. Assembly placed in position will stay set during entire process of concrete pouring. Data sheet for ordering dowel bar supports and spacers for varied pavement conditions available on request. — **Universal Form Clamp Co., 972 Montana St., Chicago, Ill.**

WORK GLOVES impregnated with "Thiokol" (synthetic rubber) resist grease, gasoline, oil and many common acids. They are well ventilated and more comfortable to wear than all-over coated gloves, being warm in winter and cool in summer. After day or two of use, they become soft and pliable. — **Thiokol Corp., Yardville, N. J.**



WIREGRIP CARDED BELT HOOKS mounted on specially processed cards hold hooks firmly in card, strengthening them and permitting workmen to cut off desired number easily without destroying or disturbing others. Made of wire especially adapted to hard usage. Applied with any standard lacer or with Wiregrip belt-lacing machine. Catalog showing complete line of belt lacing, belt hooks, belt-lacing machines, lacings and couplings for round belting and gear and wheel pullers now ready for distribution. — **Armstrong-Bray & Co., 308-310 N. Sheldon St., Chicago, Ill.**

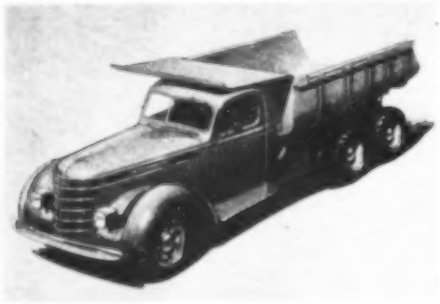


NEW TRUCK CHASSIS MODELS, EM, rated at 20,000 lb. gross and EQ rated at 23,000 lb. gross, are offered in four standard wheelbase lengths from 146 to 194 in. and three wheelbases from 141 to 158 in. on tractor. Model EM powered by 6-cylinder engine with 3⅝x5-in. bore and stroke developing 79 hp. at 2,300 r.p.m. and total piston displacement of 310 cu.in. Model EQ has 3⅞x5-in. power plant generating 92 hp. at 2,300 r.p.m. with 354-cu.in. piston displacement. Chassis frame of pressed carbon steel braced by three deep flanged box-girder type cross members. Internal expanding-type, vacuum booster actuated four-wheel brakes. Deluxe, streamline cabs with all-metal, integrally built roofs. Safety glass throughout. — **Mack Trucks, Inc., 34th St. & 48th Ave., Long Island City, N. Y.**

MOVABLE FLOOR FOR TRUCK BODY, called "Loryflor," consists of single sheet of durable cord rubber belting supported beneath by tiers of steel rollers and long enough to be rolled complete floor length to either end of truck. Rolling is accomplished in few seconds by crank handle which may be used with little effort at either end or on either side of truck. Operator controls dumping action at all times. "Loryflor" will handle almost any type of load, such as sand, coal, bags, bulky packages or large pieces of heavy machinery. Simplifies job of loading and unloading and increases number of trips truck can make. Also increases pay-load capacity, as non-tilting body may extend further beyond rear axle, bringing load center to more desirable position. — **Easton Car & Construction Co., Easton, Pa.**

STREAMLINED AIR-COOLED ENGINE. 2 hp., built for all requirements in construction and industrial field within its power range. Weight, 97 lb. Mounting dimensions, 10x10¼-in. New type pressed steel connecting rod for light weight and added strength. Carburetor has protected position behind heavy steel end plate, eliminating possibility of injury. Magneto flange-mounted, standard rotary type with impulse coupling. To facilitate ease in starting, engine is cranked off cam shaft which spins engine at double speed. Impulse coupling gives hot spark for starting. — **Novo Engine Co., Lansing, Mich.**

Construction Equipment News *(Continued)*

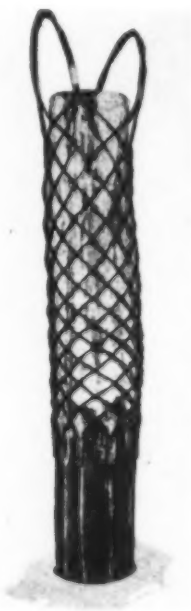


SIX-WHEEL TRUCK for heavy construction service, equipped with body of Boulder-dam type having protective armor-plate shield over cab, is one of new line of 26 International models in 77 wheel bases, ranging in capacity from ½-ton four-wheel units up to 10-15 ton six-wheelers. Increased sturdiness, more economical operation, improved load distribution and streamlined styling are features. The six-wheelers are offered in a range of 18,000 to 62,000 lb., gross vehicle weight. Valve-in-head engines; replaceable cylinders; full-pressure lubrication; hardened exhaust-valve seat inserts. Helical gear transmissions, with direct fourth speed and fuel-saving over-drive in fifth speed for long-distance hauling. Air brakes on large six-wheel units. All-steel cabs and sloping V-type ventilating wind shields. — **International Harvester Co., 606 South Michigan Ave., Chicago, Ill.**

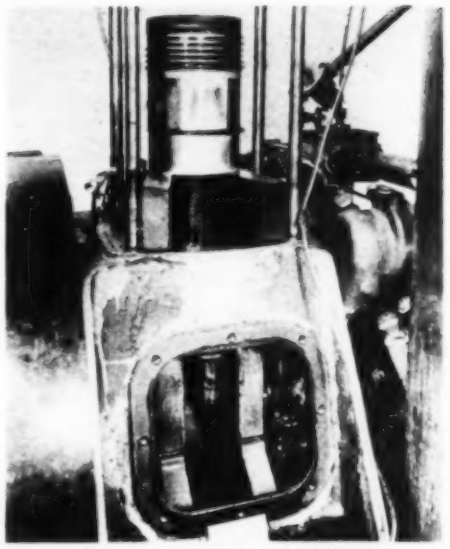
CARRY SCRAPERS. 6-, 8-, 10- and 12-cu.yd. capacities, have been redesigned to insure added strength, less weight and elimination of projections for accumulation of dirt. Fabricated steel frame structure has been changed from I-beam to welded-box type. Control pivot construction reducing power demand on tractor and lengthening life of cables in cable-type models has been retained and improved. — **Southwest Welding & Manufacturing Co., Alhambra, Calif.**

STANDARD DRAWBRIDGE MARKERS, for drawbridges and deck, pontoon, jackknife and retractile bridges, are constructed with 360-deg. white Fresnel lens using red convex panels set in two opposite sides. Light from each panel covers approximately, but not more than, 60 deg. of horizon. Non-corrosive silico-aluminum base, lens ring, cover and panel frames. Lens seated on cork gaskets and sealed in with plastic compound. Covers and color panels seated on felt gaskets, latter being held in place by bronze clips. Medium screw porcelain socket mounted on shock absorber using 50-watt clear lamp or 60-watt traffic signal lamp. Cast aluminum parts finished with metallic aluminum paint. External fittings, except drop forged steel wing screws, are nickel plated. Steel, cadmium plated internal fittings. Mounting flange finished with two coats of black weatherproof paint. — **Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.**

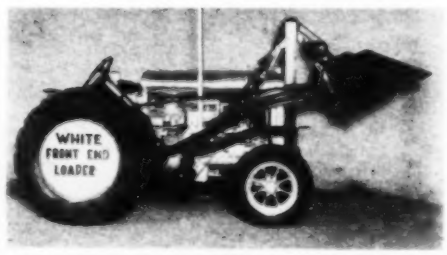
SPARK PLUGS ("AC Blue Top") of improved design for better service, performance and fuel economy and for longer life in taking care of needs of engines, buses, trucks, cars and tractors. Features: (1) Patented, one-piece, heat-sealed construction; (2) two-step, special copper alloy sealing gasket which makes compression tightness permanent; (3) improved center electrode construction, assuring gas-tight center bore; (4) isovolt electrodes to promote easy starting; (5) welded side electrode for conducting heat away from spark gap, thus prolonging plug life; (6) two-step insulator and extra wide heat range which assures peak performance at all speeds; (7) line reduced from 82 to 27 types, making proper servicing more convenient. — **AC Spark Plug Division, General Motors Corp., Flint, Mich.**



CABLE GRIP of ⅜-in. improved plow steel with tensile strength of more than 200,000 lb. pulls piles from 14 to 18 in. in diameter. Grip for pile extracting adapts expansible and contractible principle employed for years in pulling electrical cables through underground conduits. Grip is flexible, conforming to any bumps or uneven surfaces on piling, securing hold on minimum of 4 ft. of piling and extracting with no breakage. Does not cut through decayed wood of pile. — **Kellems Products, Inc., 1911 Park Ave., New York City.**



DIESEL ENGINE ALLOYED LUBRICANT, called "Ten-ol," developed after extensive tests with Caterpillar unit, is said to increase hours of operation between shutdowns, to reduce cylinder-liner and piston-ring wear and to dispose of customary end-of-season tear down of engines. Ten service factors make these improvements possible: (1) High film strength under high temperatures and pressures; (2) resistance to ring sticking even when operating with high output; (3) low cylinder-liner and piston-ring wear, even with overloads; (4) open oil channels and free acting oil control rings; (5) low blow-by of gases, practically eliminating corrosion of cylinder walls and contamination of crank case oil; (6) non-carbonizing; (7) non-sludging; (8) high oiliness; (9) economical oil consumption; (10) uniform quality. Photo shows test engine after 1,093-hr. accelerated wear test made with "Ten-ol." Note perfect condition of rings and piston and cleanliness of crank case after draining. Measurements after test revealed that wear on cylinder liners was less than one-tenth of wear on engines lubricated with high-grade straight mineral oil. — **Sinclair Oil Co., 630 Fifth Ave., New York City.**



FRONT-END ATTACHMENTS for wheel-type industrial tractors, formerly products of Trackson Co., of Milwaukee, are now being made by White Manufacturing Co., which offers to contractors five models: (1) Excavator, grader and material mover with ½-cu.yd. bucket or shovel and 3-ft. lift; (2) loader with ⅜-cu.yd. bucket and 7-ft. lift for loading standard motor trucks at side or rear; (3) special high-lifting machine, 8½ ft., equipped with ⅝-cu.yd. bucket for handling snow, cinders and other light-weight materials; (4) backfiller or grader with 6 ft.x20-in. moldboard and blade that can be tilted or set at angle to push material to either side as well as straight ahead; (5) platform hoist for vertical lifting of materials for storage or loading. — **White Manufacturing Co., Elkhart, Ind.**

TRUCK-MIXER UNIT comprises 4-yd. Rex self-powered mixer mounted on Autocar cab-over-engine truck of 128-in. wheelbase with streamlined cab, owned by Thomas Henry Material Co., subsidiary of Ravegno Hall Co., Jersey City, N. J. — **Autocar Co., Ardmore, Pa.**

News from Manufacturers

ABOUT THEIR PRODUCTS

The publications, reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

CENTRIFUGAL PUMPS — **C. H. & E. Manufacturing Co., Inc.,** Milwaukee, Wis. (16 pp., illustrated). Self-priming units, with pump shells enlarged to give wide water passages for handling maximum amount of solid material and for holding more priming water. In small and large, heavy-duty sizes. Double grease seal and thrash-type impeller. The 2-in. portable model for small jobs handles 7,000 gal. per hour; weight on two-wheel rubber-tired mounting, 175 lb. Other sizes (2 in. to 8 in.) up to 125,000 g.p.h., weighing 2,400 lb. Pumps without power units for belt drive. Variety of wheel and skid mountings.

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UNDERGROUND STEAM CONDUIT — **H. W. Porter & Co., Inc.,** 825 Frelinghuysen Ave., Newark, N. J. (6 pp., illustrated). Step-by-step pictorial presentation of how to install Therm-O-Tile conduit envelope on concrete base to inclose steam pipes.

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TRACTOR ACCESSORIES—**Caterpillar Tractor Co.,** Peoria, Ill. (48 pp., illustrated). Storage tank to keep diesel fuel clean; front bumper; crankcase guard; track roller guard; radiator guard; front pull hook; engine guards; spark arrester; exhaust muffler; lubricating oil filter; air cleaner inlet pipe extension; two-speed starting engine transmission; electric starting equipment; lighting equipment; fuel systems for other fuels; gears for special speeds; high-compression pistons, cylinder heads and combustion chambers; belt pulley drive; power take-offs; side and rear seats; drawbars; odometer; hour-meter; cab; canopy top; snow sprocket; multiple-implement hitch; power lift; special tracks.

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CLAMSHELL BUCKETS — **Owen Bucket Co.,** Cleveland, Ohio. (28 pp., illustrated). Explains specific features of various types of bucket and makes recommendations to aid in selecting proper bucket for any kind of service. Sizes range from ¼ to 4½ cu.yd. and types include general purpose (¼ — 2 yd.); material handling (⅜ — 4½ yd.); heavy-duty, for excavating or dredging hard material (½ — 2 yd.); extra heavy-duty (¾ — 3 yd.); extra heavy round-nose, (¾ — 3 yd.). Tabulation of weights and sizes of buckets for rehandling and excavating under three types of service, easy, medium and hard. Counterweight jackets, teeth and attachments for three- and four-line buckets. Also, special buckets for snow, scrap, coke, coal, etc. Low headroom extra light buckets and grapples for handling rock.

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TRUCK MIXERS AND AGITATORS—**Chain Belt Co.,** Milwaukee, Wis. (44 pp., illustrated). Dimensions and weights of Rex Moto-Mixers in 1-, 1½-, 2-, 3- and 4-yd. sizes (agitator ratings of 1½ to 6 yd.) mounted on trucks, 3- and 4-yd. Moto-Mixers mounted on semi-trailers and special 4½-yd. agitator. Fast-charging hatch, cone drum mixing action, self-measuring water system, one-lever cab control of two-speed drum driven by chain from six-cylinder engine or by power take-off from truck engine, jackass hoist for raising rear end of drum in discharging, one-man hand control of discharging operations, and one-man pivoted discharge spout.

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FLUTED STEEL PILE SHELLS — **Union Metal Mfg. Co.,** Canton, Ohio. (16 pp., illustrated). Description of cold-rolled fluted steel shells for tapered, cast-in-place concrete piles in standard lengths up to 70 ft. Tapers are 1 in. in 7 ft. and 1 in. in 4 ft. Gage of steel shells usually No. 11 (⅛ in.); available in No. 7 (3/16 in.) and No. 3 (¼ in.) gages. Nose diameters 6, 8 and 14 in. High bearing value claimed. Fluting increases skin frictional area. Examples of application illustrated. Specifications for cast-in-place concrete piling.

DRILLS AND COMPRESSORS—**Worthington Pump & Machinery Corp.,** Harrison, N. J.—(24 pp., illustrated). Complete line of rock drills, portable and stationary air compressors and pumps for construction service. Illustrations cover variety of drill mountings and jumbo carriages for tunnel work. Pneumatic-feed and screw-feed drifter rock drills. Wagon drills on two-wheel mountings for deep hole work. Portable air compressors in five sizes from 60 to 315 cu.ft. of free air per minute. Diesel and gasoline engine power units. Vertical turbine pumps for unwatering cofferdams.

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OXYGEN LANCE — **Linde Air Products Co.,** 205 East 42nd St., New York, N. Y. (8 pp., illustrated). Pipe length through which oxygen flows at regulated pressure for drilling holes or cutting heavy masses of iron, steel or slag. For emergency or routine repair and maintenance operations, such as cutting out "frozen" shaft of wheel or pulley, hinge pin, removal of foundation bolts from concrete bases. Method of operation described, with sketches.

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POWER TRANSMISSION EQUIPMENT — **Link-Belt Co., Chicago, Ill.** (208 pp., illustrated). Book No. 1500 gives list prices, dimensions and ratings of pillow blocks, clutches, collars, couplings, gears, hangers, pulleys, shafting, take-ups and grease cups.

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CEMENT GUN — **Cement Gun Co.,** Allentown, Pa. (66 pp., illustrated). Details of design and operation of machine, operated by compressed air and equipped with air motor and feed-wheel, bringing cement-sand mix through outlet valve to nozzle, where water, in spray form, is added to form "Gunite." Data on adhesion, density, strength, expansion and compression value of Gunite. Test results on slabs. Numerous examples of application, profusely illustrated with photographs, to building construction, bridges, piers, jetty walls, dams, retaining walls, reservoir lining, tanks, swimming pools, flumes, steel stacks, lining for steel pipe, tunnel lining, encasement of wood piles for protection against teredo. Detailed specifications for Gunite floor, roof and wall slabs, covering brick, tile or concrete walls, waterproofing, reconditioning concrete structures, reservoir lining.

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ROLLING DOORS—**Cornell Iron Works, Inc.,** Long Island City, N. Y. (8 pp., illustrated). Applicable to warehouses, freight platforms, garages, office buildings, power plants, etc. Galvanized steel slats roll up out of the way overhead and waste no floor space. Types include self-coiling, hand chain and gearing and motor drives, the latter for the largest door openings. Line includes also rolling fire doors controlled by fusible links that effect closure at 150 deg.

• • •

POWER PUMPS — **Fairbanks, Morse & Co.,** 900 S. Wabash Ave., Chicago, Ill. (6 pp., illustrated). Self-oiling pumps for handling mud and slush, in connection with rotary drill rigs, clear water and other liquids. Belt drive or top-mounted motor drive. Capacities, 23 to 94 g.p.m. with pressures up to 475 lb. per square inch.

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DEEP-WELL TURBINE PUMPS — **Byron Jackson Co.,** Berkeley, Calif. (40 pp., illustrated and printed on aluminum tinted pages). Four types of bowl assembly, each in several sizes, for different performance characteristics in wells from 8 to 24 in., or larger. Graphs show hydraulic characteristics, capacities and efficiencies. Specifications for each pump type. Illustrations and data on discharge columns and discharge heads. Notes and diagrams on power balance in deep-well turbine. Charts of friction losses for deep-well columns. Examples of installations illustrated. Six pages of "Engineering Information," including formulas for pumping costs, conversion factors, horsepower ratings, pipe friction chart for water and method of measuring power consumption.

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EARLY-STRENGTH CEMENT — **Lehigh Portland Cement Co.,** Allentown, Pa. (31 pp., illustrated). What it is, what it does, what it can be used for. Examples of how quick-service-strength concrete saves money and time in construction. Answers to queries regarding characteristics and use of high-early-strength concrete. Estimating data in tabular form, including quantities of materials and estimated strength in 1, 3 and 7 days for both normal and high-early-strength cement using gravel, 1-in. stone and 2-in. stone. Notes on selecting mix for different types of service.

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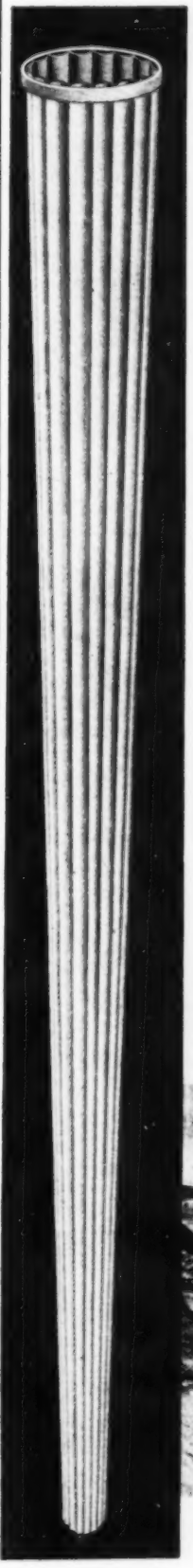
UNION METAL *fluted steel* PILE SHELLS



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This is just one of the savings made possible by these sturdy tapered shells. Their light weight simplifies your handling problems, cuts driving time and permits use of crane, which is already on the job, with ordinary leads and hammer.

If you want to speed up the job and increase your profits, specify Union Metal Shells for cast-in-place concrete piling.

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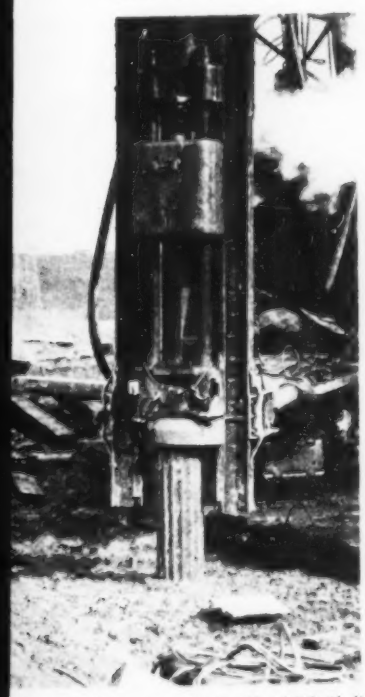
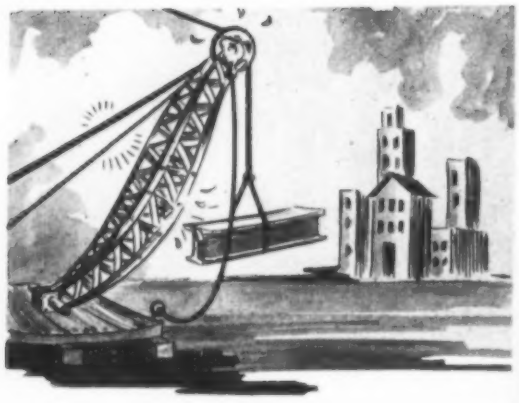


• *Driving 11-gauge Union Metal Pile Shells for Southerly Sewage Disposal Plant, Cleveland, Ohio.*



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News from Manufacturers

ABOUT THEIR PRODUCTS

(Continued)

WRENCHES — **J. H. Williams & Co.,** 75 Spring St., New York, N. Y. (52 pp., 3½x6 in., illustrated). Describes and illustrates full line of Supersocket wrenches (detachable sockets), chrome-molybdenum Superwrenches. The Superector, a new, heavy-duty reversible ratchet wrench, with quadruple pawls and drop-forged handle, non-sparking safety wrenches of beryllium-copper and new lines of adjustable wrenches. A second booklet (36 pp., 3½x6 in., illustrated) covers the company's line of full drop-forged carbon steel wrenches in 50 patterns and more than 1,000 sizes, including bull-dog and screw types. Tabulations of sizes and prices.

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SOIL TESTING INSTRUMENTS — **American Instrument Co.,** 8010 Georgia Ave., Silver Spring, Md. (20 pp., illustrated). Describes and illustrates apparatus for soil sampling in connection with study of subgrade material and foundations. Soil sampling augers, tubes and hammers, splitters for preparation of soil samples, sieves, hydrometers. Notes on procedure and equipment for mechanical analysis of soils. Moisture equivalent centrifuge machine. Soil plasticity needle. Devices for determining compression and shear properties of soils. Pressure cells for readings within hydraulic fills, earthwork and dams. Soil testing kits.

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SAFETY SAW — **D. W. Onan & Sons,** 41 Royalston Ave., Minneapolis, Minn. (6-p. folder, illustrated). Power driven by electric motor or gas engine. Made in four sizes. Cutting capacity up to 2x12-in. or 4x8-in. lumber. Largest size has 12-in. blade and 2-hp. motor. Guarded movable blade. Lumber is held stationary and saw is drawn through it.

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STAINLESS STEELS IN ARCHITECTURE — **United States Steel Corp.,** Carnegie Building, Pittsburgh, Pa. (16 pp., illustrated). Facts, photographs and drawings of architect and fabricator dealing with stainless steel in a variety of applications. Information on corrosion resistance, methods of fabrication, finishes available and physical properties. Examples of use in building exteriors and interiors, including towers, facades, marquees, store fronts and entrances. Section on fabrication gives picture of various operations that may be performed with this metal.

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SMALL HOUSE COMPETITION — **Structural Clay Products Institute, Inc.,** Washington, D. C. Folder on competition for design of moderate cost house built of brick or other clay products. Open to architects, engineers, contractors and operative builders. Prizes total $5,000. Closing date, Sept. 20, 1937.

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TRAVELING STEEL FORMS — **Ransome Concrete Machinery Co.,** Dunellen, N. J. (6 pp., illustrated.) Special equipment for concreting tunnels, sewers and aqueducts. Three independent adjustments on telescopic steel forms. Hydraulic jacks for collapsing forms. Inside and outside forms. Tunnel concrete mixers and grouting machines. Pneumatic concrete placers.

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CAVALCADE OF DIESEL — **Caterpillar Tractor Co.,** Peoria, Ill. (24 pp., illustrated). Non-technical sketch, by John B. Kennedy, writer and radio commentator, of the history of the diesel engine and its inventor, Dr. Rudolf Diesel.

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TRAFFIC SIGNALS AND CONTROLS — **Crouse-Hinds Co.,** Syracuse, N. Y. (Loose-leaf, illustrated catalog, with index). Wide range of newly designed one, two and three-way traffic signals, with notes on reflectors, lenses, and hoods. Detailed specifications. Beacons and flashers. Isolated controls. Time-space graphs for progressive traffic control. Traffic flow regulator. Poles and pedestals. Engineering data on color sequences and field wiring for timing switches.

DIESEL ENGINES — **Cummins Engine Co.,** 220 Wilson St., Columbus, Ind. (74 pp., illustrated). An attractively bound booklet, fully illustrated, indicating the versatility and adaptability of diesel engines in a variety of models ranging in size from 20 to 500 hp. Applications of diesel power include trucks, logging operations, marine equipment, road building, public walks, power shovels, cranes, trench excavators, road rollers, oil well drilling, industrial and railroad locomotives, irrigation pumping, and rock crushers. In addition to descriptive text, the booklet contains reproductions of advertisements by manufacturers of equipment powered by diesel engines.

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STREET LIGHTING EQUIPMENT — **Westinghouse Electric & Mfg. Co.,** East Pittsburgh, Pa. (Series of new catalog sections, illustrated). Standards and fittings for street and highway lighting, including cast-iron standards in a variety of styles and sizes. Hollow-spun reinforced concrete standards, cold-rolled steel standards, top sections and casings, brackets and ornamental crooks for street and park installations.

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BULLDOZERS — **Baker Manufacturing Co.,** Springfield, Ill. (31 pp., illustrated). Eleven models of bulldozers and gradebuilders for Allis-Chalmers tractors. Operated by twin-cylinder hydraulic direct lift. Cylinder bracket clamps over truck roller frame of tractor, placing weight directly over center line of tracks. Bulldozers usually factory-mounted. High blade lift. Interior bracing for moldboard; can be equipped with side wings. Moldboard lengths from 73 to 122½ in. for bulldozer and from 94½ to 158½ in. for gradebuilder. Photos illustrate variety of applications.

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CONTRACTORS' EQUIPMENT — **Jaeger Machine Co.,** Columbus, Ohio. (Broadside, 8 pp., illustrated.) Descriptive material and photos on automatic priming pumps rated at from 7,000 to 200,000 g.p.h.; triplex road pumps; well-point systems; concrete mixers in sizes from 3½S to 56S; hoists; concrete carts; towers and concrete chuting equipment; bituminous pavers; mix-in-place road builders; concrete finishers and vibrators; truck-mixers in 1- to 5-cu.yd. sizes.

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UPWARD-ACTING DOORS — **Cornell Iron Works,** 13th St., and 36th Ave., Long Island City, N. Y. (12 pp., illustrated). Rolling type for industrial use made of interlocking metal slats running on vertical steel side guides and flexible to coil around overhead pipe shaft. Also rolling grilles float-over doors, canopy doors, bi-fold doors and vertical-lift doors.

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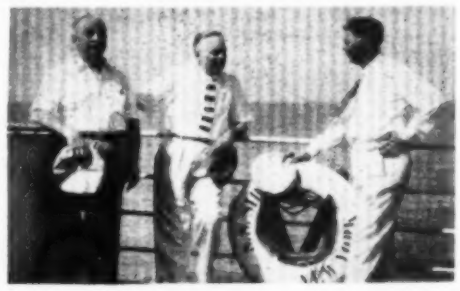
FOUR REAR WHEEL DRIVE — **Thornton Tandem Co.,** 5124 Braden St., Detroit, Mich. (8 pp., illustrated.) Designed for installation on 1½-ton Ford or Chevrolet trucks to increase traction for handling 9 tons. Thornton drive consists of dual ratio transfer case containing helical gears, trunnion tubes, spring assemblies, deep frame channels, shifter control, brake members, rear axles and additional wheels and tires. No change in engine, front axle, front springs, steering assembly or standard transmission. Tabulation of performance data in terms of road speeds, gear ratios, rim pull and grade ability.



AFTER THE ROAD SHOW. Bound for New York on the S.S. Siboney, after traveling to Vera Cruz, Mexico, from New Orleans, La., scene of this year's convention of the American Road Builders' Association, are these equipment manufacturers (left to right): Roy E. Choate, president, LaPlant-Choate Mfg. Co., Cedar Rapids, Ia.; W. McK. White, president, White Mfg. Co., Elkhart, Ind.; and C. O. Wold, vice-president, Caterpillar Tractor Co., Peoria, Ill.

COLD-LAID ASPHALT — **Barber Co., Inc.** 1600 Arch St., Philadelphia, Pa. (28 pp., illustrated). Trinidad Lake asphalt is major ingredient of Trinidasco, cold-laid mixture for building, resurfacing and maintaining pavements. Process consists of dispersing pulverized Trinidad Lake asphalt into mixture of crushed stone, screenings or natural sands, mineral fillers and a special emulsified fluxing agent. Intended for use where hot mixtures are not practical from economic or design standpoint. Mixtures may be stocked for maintenance purposes. Company's Technical Bureau will make study of available local mineral aggregates as basis for recommended mix.

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PNEUMATIC SEWAGE EJECTOR — **Yeomans Bros. Co.** 1443 Dayton St., Chicago, Ill. (4-pp. folder, illustrated). Describes and illustrates Shone electrically-controlled, pneumatic sewage ejector designed to eliminate floats, bells, air tanks, float switches, stuffing boxes and moving parts on or inside the ejector. Air admitted when pot is filled and ejected when pot is empty. For large buildings, booster stations and municipal sewage systems. Sizes from 50 to 600 g.p.m.

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SHIELD-ARC WELDERS—**Lincoln Electric Co.** Cleveland, Ohio. (4 pp., illustrated). Explains how dual continuous control, by adjustment of both series and shunt fields, gives any type of arc for every value of welding current. Device on welder permits engine to idle at low speed when not welding.

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DREDGES — **Dravo Contracting Co.** Engineering Works Department, Pittsburgh, Pa. (16 pp., illustrated). Examples and master specifications of ladder-bucket dredges, hydraulic (suction) dredges and dipper dredges.

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CONCRETE FLOOR TREATMENTS — **Truscon Laboratories.** Detroit, Mich. (12 pp., illustrated). Metallic floor hardeners, non-slip hardeners, integral hardening and coloring, surface treatments, floor enamel. Products applicable both to new construction and maintenance. Detailed specifications covering application and colors of floor hardeners. Correction of concrete floor dusting by chemical hardening or application of penetrating binder and surface filler.

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SELF-LOCKING BOLTS AND NUTS — **Dardelet Threadlock Co.** 55 Liberty St., New York, N. Y. (4 pp., illustrated). Self-locking screw thread provides positive lock of bolt and nut without washers or nut-holding devices. Quick assembly and disassembly. Two series of pitches, coarse and fine. Rivet-bolts for structural steel connections. Tabulation of comparative thread data.

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INDUSTRIAL HOISTS—**Harnischfeger Corp.** Milwaukee, Wis. (20 pp., illustrated). Handling "off the floor" loads, from 15 lb. to 15 tons, with P&H units and monorail systems. Applications illustrated. Types of mountings include bolt or lug suspension, hand-geared trolley, plain trolley, hook suspension, high-lift and motor-driven trolley. Tabulation of ratings and operating ranges. List of electrical accessories.

• • •

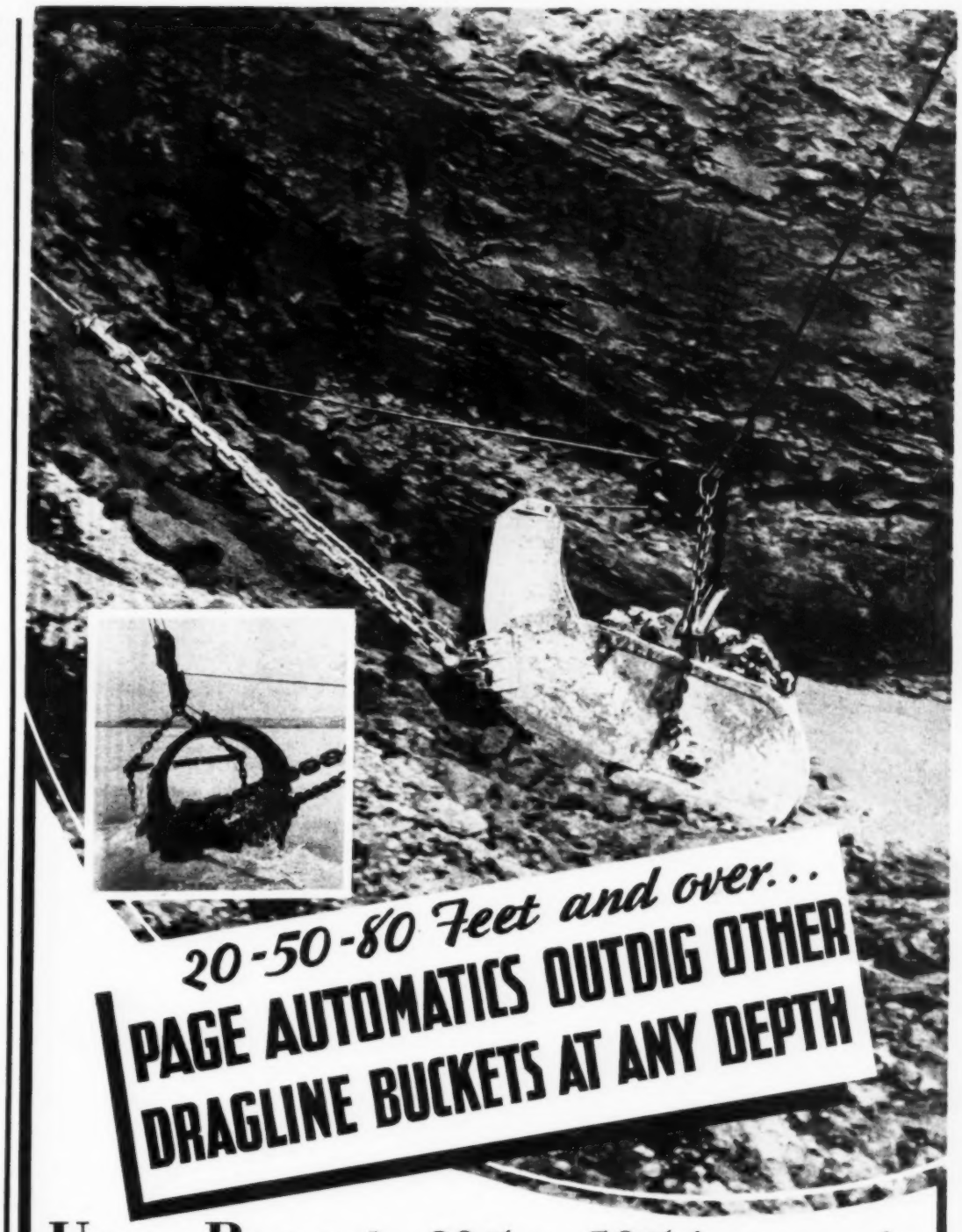
COMPENSATING WELDING ROD—**Electric Arc Cutting & Welding Co.** 152 Jelliff Ave., Newark, N. J. (1-p. leaflet). Tapered welding rod has small section at tip to give quick heat and easy starting. Back of tip gradual increase of rod diameter increases deposit and keeps heat constant.

• • •

DRAFTING ACCESSORIES — **Wade Instrument Co.** 2246 Brooklyn Station, Cleveland, Ohio. (Folder, illustrated). Sketch pad set of tracing paper with a guide sheet carrying isometric pattern on one side and 1/8-in. squares on the other. Also an adjustable, flexible-core and metalized rubber guide for drawing irregular curves. Beam compasses, blueprint papers in sheets and tracing papers.

• • •

HEAVY-DUTY EQUIPMENT — **Koehring Co.** Milwaukee, Wis. (16 pp., illustrated). Pictorial presentation on large-size pages (12x18 in.) of wide range of heavy equipment in actual service on the job. More than 100 on-the-job illustrations of power shovels, trailers, cranes, draglines, trenchhoes, self-powered earth-moving wagons, paving mixers, longitudinal finishing machines for concrete pavement, mud-jacks, construction mixers in large and small sizes. A pictorial "parade" of equipment application.



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As hundreds of AUTOMATIC owners have done — you, also can increase your dragline yardage and profits. For information on a size and weight AUTOMATIC bucket best fitted to your machine and job, see your equipment dealer or write us direct. Free bulletin "The AUTOMATIC" gladly sent on request. Address Dept. S.

BUILT IN SIZES 3/8 to 15 CUBIC YARDS

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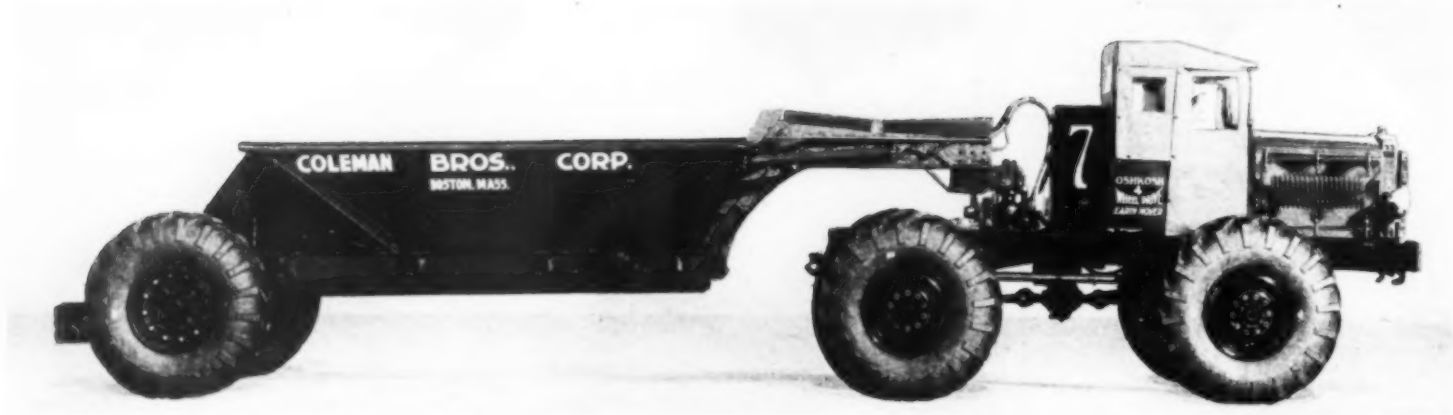

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Air-powered steering on all four wheels reduces strain on the driver and enables the operator to make a U turn within 31½ feet. This short turning radius and its speed make the OSHKOSH 4-Wheel Drive EARTH MOVER exceptionally efficient in hauling from a shovel. Brakes on all six wheels insure maximum control.

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The semi-trailer can be quickly and easily removed, and the truck used for pulling scrapers and other types of equipment. Ask for our special Earth Mover Circular.

- **Speed up to 35 miles per hour**
- **Complete unit turns 31½ foot circle**
- **Capacity 10 to 15 yards**
- **4-Wheel air power steer**
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Oshkosh, Wisconsin

GOOD NEWS *in times of rising prices!*

GELODYN SAVINGS *from higher cartridge count*

Standard Ammonia Gelatin Explosives 95 ctgs. per case

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If you're cost minded... get Gelodyn minded!

Material and labor costs are rising. Engineers, contractors, miners, quarrymen—everyone becomes increasingly alert to performance per dollar cost. Everyone is looking for ways to do the job as well as before, but at less expense.

And—where gelatin type explosives are involved—try Atlas Gelodyns!

Gelodyns offer a combination of qualities that often effect worthwhile savings on many jobs.

1. **Better water resistance than non-gelatinous explosives.**
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EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

Here's Proof

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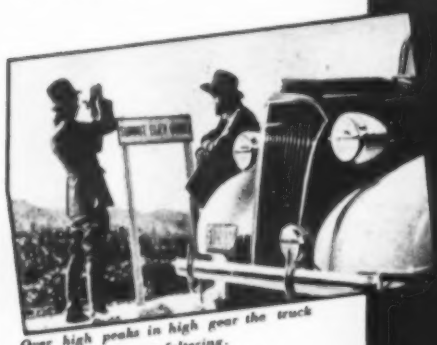
A. A. A. officials selected the half-ton pick-up at Chevrolet's Flint plant.

Long mountain grades, like this one, tried the truck's mettle over many hard miles.



Over high peaks in high gear the truck went forward, never faltering.

The searing sands of the desert, with temperatures up to 116 degrees, were met with ease.

The thermometer held below freezing for days, with highways covered with snow.

CHEVROLET "ECONOMY MODEL" TRUCK

hauls certified 1000-pound load

10,244 MILES

at cost of

less than 1¢ PER MILE for gas

This Chevrolet "Economy Model" truck was equipped with Genuine Chevrolet Accessories.

The first oil—two quarts were added at San Francisco, after 3,850 miles.

City officials joined in welcoming the half-ton pick-up truck back to Detroit.

AAA CONTEST BOARD — SAFETY — ECONOMY — SPEED

Study this
unequaled record—then buy
CHEVROLET TRUCKS

Location of Test	'Round the Nation —Detroit to Detroit
Distance Traveled	10,244.8 Miles
Gasoline Used	493.8 Gallons
Oil Consumed	7.5 Quarts
Water Used	1 Quart
Gasoline Cost	$101.00
Gasoline Mileage	20.74 Miles per Gallon
Average Speed	31.18 Miles per Hour
Running Time	328 Hours, 31 Minutes
Gasoline Cost per Mile	$.0098
Average Oil Mileage	1,365.9 Miles per Qt.
Total Cost of Repair Parts	$ .73

These records have been certified by the A.A.A. Contest Board as being officially correct.

Here, in these amazing facts and figures, is definite proof that Chevrolet trucks are the best trucks for you! . . . See your nearest Chevrolet dealer today, and buy Chevrolet trucks for *more power per gallon, lower cost per load*—for maximum dependability and maximum all-round economy.

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"MORE POWER per gallon LOWER COST per load"

Investigate—know the Fine Performance

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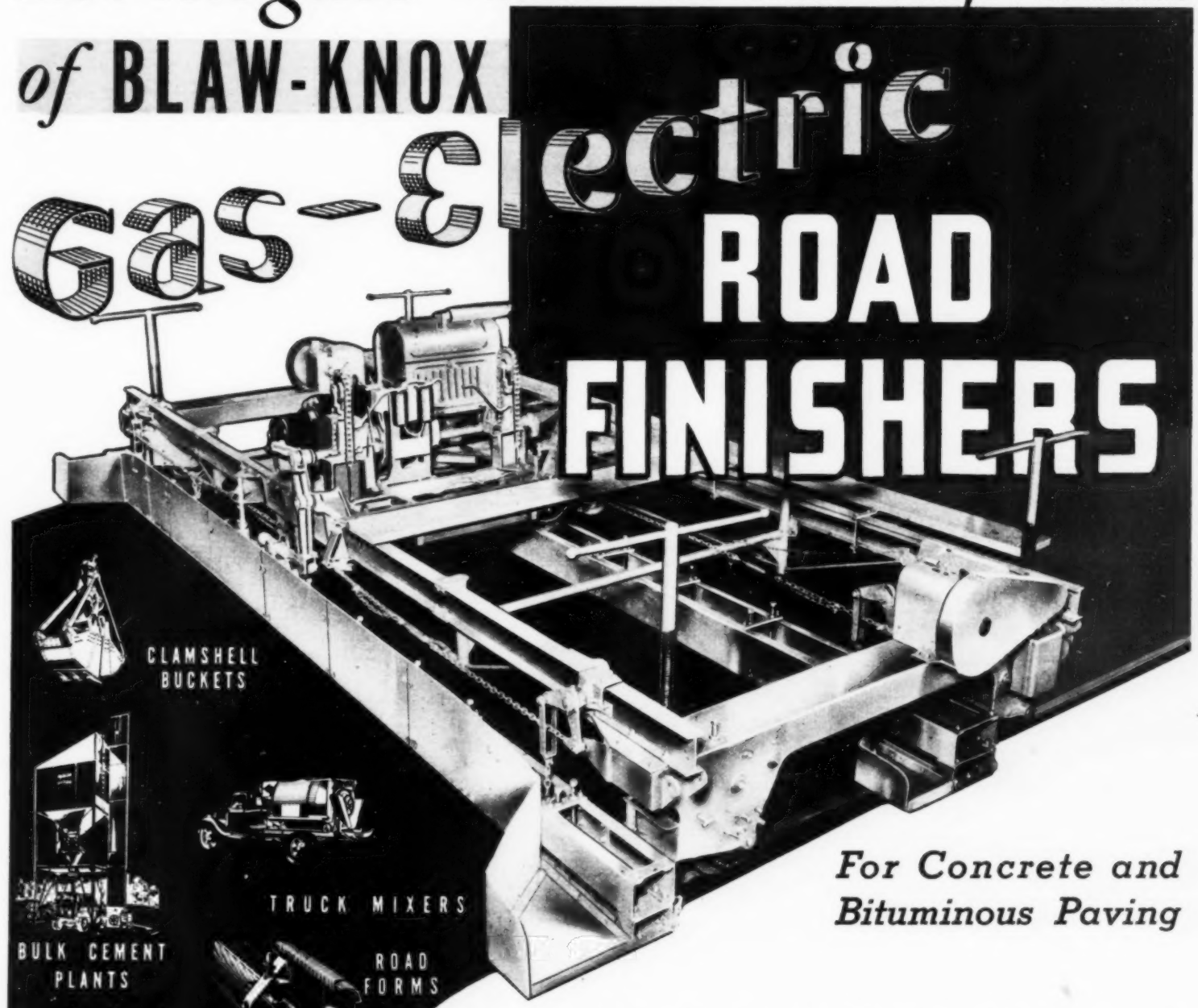
Gas-Electric ROAD FINISHERS



For Concrete and Bituminous Paving

CLAMSHELL BUCKETS

BULK CEMENT PLANTS

TRUCK MIXERS

ROAD FORMS

BATCHERPLANTS

STEEL STREET FORMS

Blaw-Knox Road Finishers are also furnished in the gas engine driven type—when desired.

also: WEIGHING BATCHERS for Aggregates and Cement . . . CENTRAL MIXING PLANTS . . . TRUCK MIXER LOADING PLANTS . . . STEEL FORMS for General Concrete Construction . . . CONCRETE BUCKETS . . . BOTTOMLESS SCRAPERS . . . SHEEPSFOOT TAMPING ROLLERS.

★ The use of the Blaw-Knox Gas-Electric Road Finisher by road building contractors throughout the country is definite proof of the practical efficiency demonstrated by the Blaw-Knox gas-electric principle

Some of the advantages of the Blaw-Knox Gas-Electric Road Finisher are:

- Rapid and easy adjustment of width.
- More positive and smoother power and traction.
- Greater accuracy of steering on the forms.
- Easier on the road forms.
- Faster, greater flexibility of speeds.
- Removable flanges on traction wheels, for quick wheel changes.
- Vibrator for joints can be plugged in on the finisher, eliminating the need of a separate generator.
- Smoother and truer finish of slab.

These and many other points of performance and convenience have been demonstrated conclusively in the field under a great variety of paving conditions.

If you wish further details of the Blaw-Knox Gas-Electric Road Finisher, send for Blaw-Knox Catalog No. 1507.

BLAW-KNOX COMPANY

2086 FARMERS BANK BUILDING · PITTSBURGH, PA.

Offices and Representatives in Principal Cities

YOU SAVE 1056 JOINTS PER MILE

● Installing an Asbestos Bonded Armco sewer line 28 feet below ground level in a progressive mid-western municipality.

NO WONDER contractors are happy when engineers specify *Asbestos Bonded* Armco pipe for permanent drainage and sewer lines. Think of the generous savings in installation costs!

Compare, for example, *264 joints* in a mile of Armco pipe (20-foot lengths) with the *1320 joints* ordinarily required when short sectional pipe is used. And remember, each short section is an individual installation job. It not only must be unloaded and handled, but it must also be "bedded", joined, and well tamped.

That's why it costs *only one-fourth to one-tenth as much* to lay, line and join Armco pipe—to say nothing of the saving in breakage due to handling. With Armco pipe the joints are far apart, easy to make, and foolproof, as only tightly-connected joints can be. Vote for these features and you vote for pipe jobs that turn out satisfactorily for everyone concerned. Armco Culvert Mfrs. Association, Curtis Street, Middletown, Ohio.

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ARMCO PAVED INVERT PIPE

Although the price of the Bearcat Jr. is lowest, the quality of the machine is right *up* there with other ⅜ yd. shovels.

Large quantity production accounts for much of the saving in price on the Bearcat Jr. Simplified design accounts for additional savings. There are fewer parts in this shovel than in any other. But every part is rugged and oversize.

That's why the Bearcat Jr. has earned a wide reputation for being a dependable dirt mover. Ask any one of hundreds of Bearcat Jr. owners. The first machine built and sold in 1932 is still working for its original owner.

No Bearcat Jr. has yet been worn out in service or been discarded as no longer serviceable. It's a mighty good shovel and it will make money for you. Write today for complete catalogs that tell you everything you'll want to know about the Bearcat Jr.

THE SELLING PRICE OF BYERS BEARCAT JR. IS AT LEAST $500 BELOW THE SELLING PRICE OF ANY OTHER POWER SHOVEL BUILT TODAY • WRITE FOR PRICES TO BYERS, RAVENNA, OHIO

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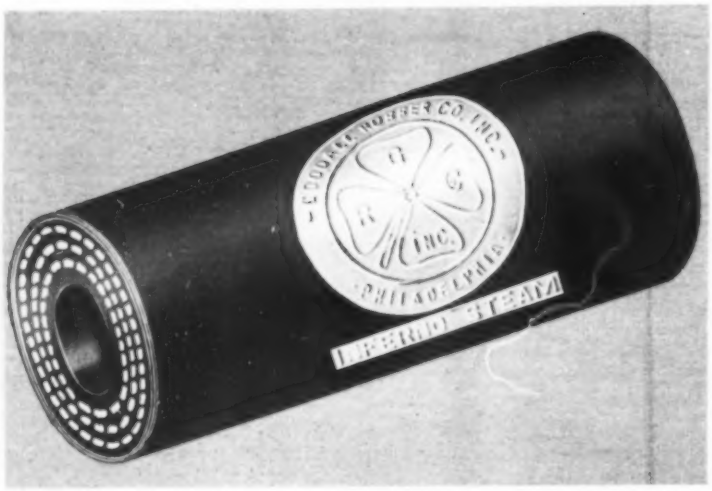

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Highest Temperatures

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GOODALL INFERNO STEAM HOSE

Constructed of long-fibre asbestos yarn, wire reinforced, and with a tube especially compounded to withstand extreme temperatures, GOODALL INFERNO STEAM HOSE will give far more than ordinary service under the most difficult conditions. Records prove that for *heavy-duty* jobs, this hose provides the *lowest cost for service,* no matter how that cost is figured. Prove it yourself, the next time you have a real tough job for steam hose!

Made and stocked in all sizes from ½" to 2" I.D., 2 and 3 braid, and in maximum lengths of 50 feet.

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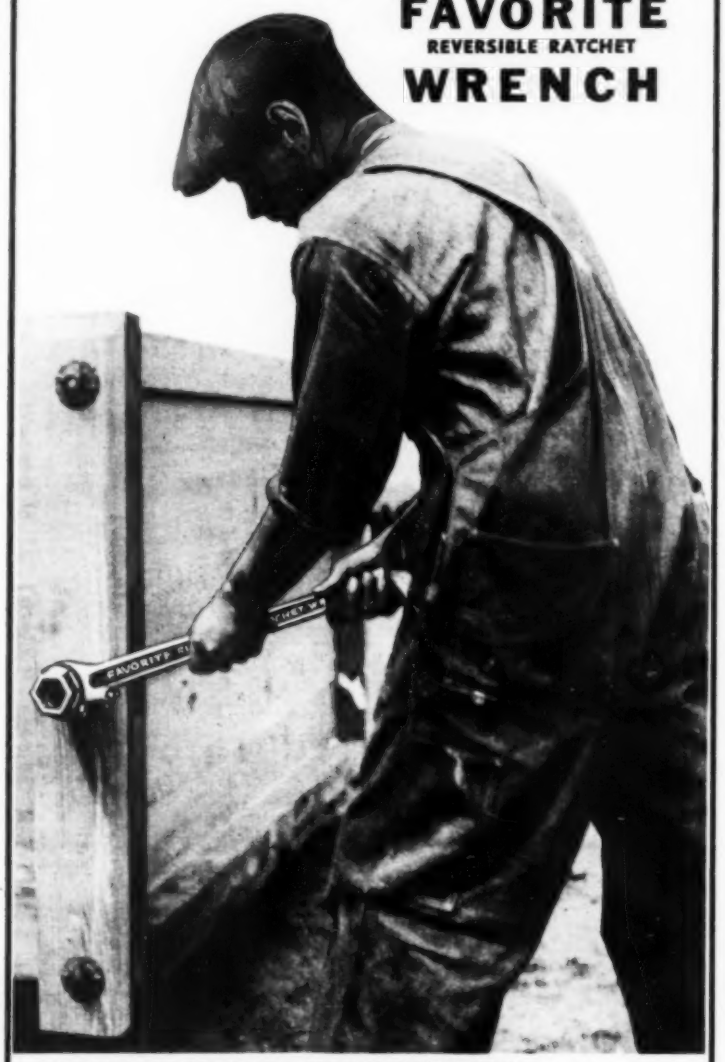
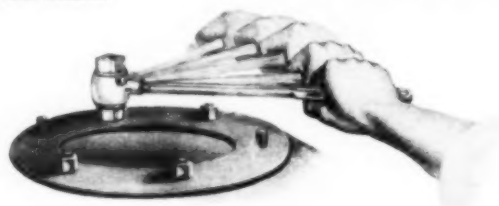
IN THE TURNING OF NUTS
IF YOU USE THE
FAVORITE
REVERSIBLE RATCHET
WRENCH



EACH HEAD CAN TURN TWO DIFFERENT-SIZED NUTS

This is a great saving over ratchet wrenches that turn only one nut in each head, as it means fewer parts to keep on hand.



WORKS ON A QUICK STRAIGHT-AHEAD RATCHET MOVEMENT

The new metal now used in Handles, Heads and Pawls enables the "Favorite" to stand up under harder and rougher usage. Ratchet movement eliminates all lost motion. Does not leave the nut until operation is completed.

A TIME-SAVER

Can be used in narrower places than an ordinary wrench. Each head can turn two different-sized nuts—one in each end. Opening in head allows bolt to pass clear through.

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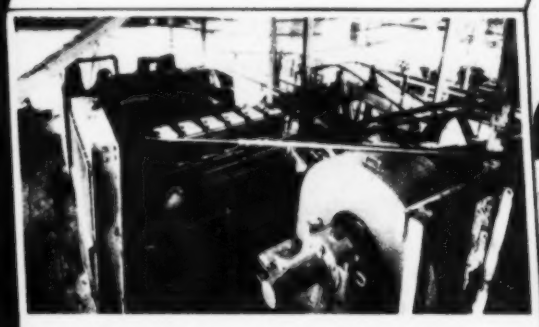
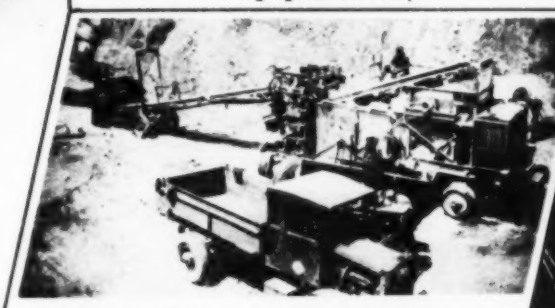
COAL: A strip mining operation . . . 15 Cummins Diesel powered dump trucks on a 24-hour schedule.

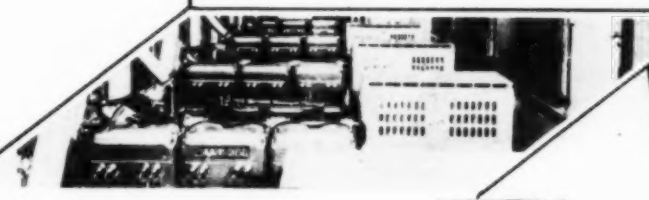


OIL FIELDS: A constantly increasing number of Repeat Orders for Cummins Diesel powered drilling rigs tell the story.

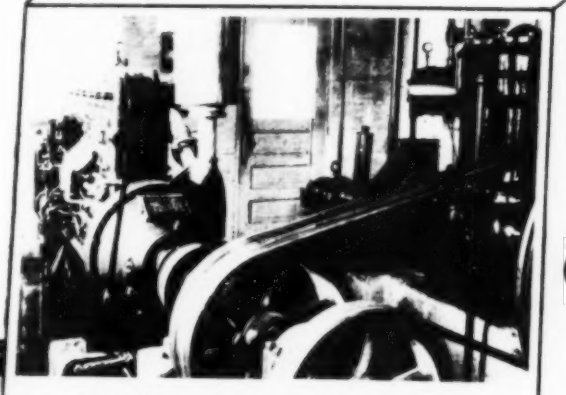


ROCK CRUSHERS: In addition to its economy, the smooth running of the Cummins Diesel means less wear on the belts.

A NEW BOAT FOR THE TVA . . . powered by a Cummins Diesel Model HMR-6.



GENERATING: Four Cummins Diesel generating sets furnish the auxiliaries on the Burlington Zephyr.



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The high flat torque of the Cummins Diesel provides extra power for digging and crowding . . . speedy acceleration for more swings and dumps per hour. Complete flexibility and close governing for full control at all times.

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The smooth running Cummins Diesel delivers a steady flow of power . . no high compression knocks —no falling off of power under load.

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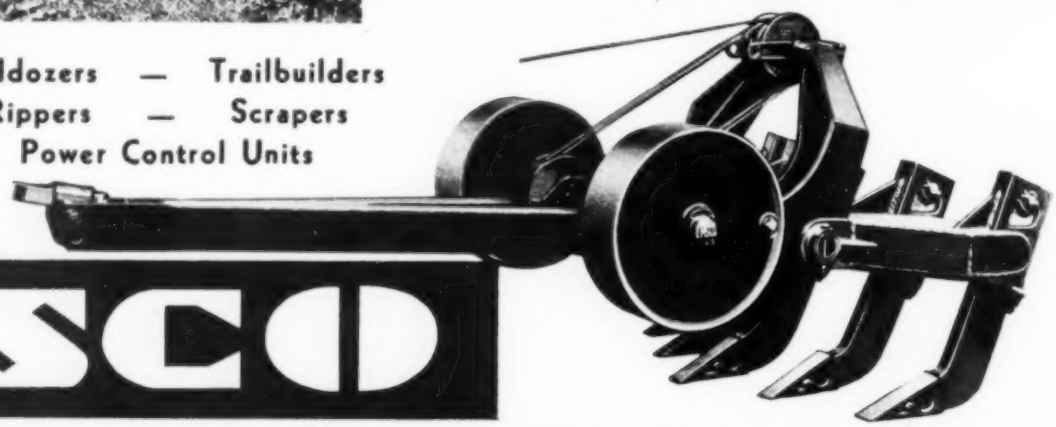
Rippers — Scrapers
Power Control Units



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Illustrating a Model 210 SCHRAMM "Utility" Compressor mounted on a 1½-ton Chevrolet Truck. Other types of same rating require 3-ton truck. Think of the savings! Sizes 105, 210, 315 and 420 cu. ft. actual air. Gasoline or Diesel power.

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The Koehring Longitudinal Finisher is a new machine which, automatically and mechanically, assures a perfect finish for concrete highways. Smoother riding concrete highways are now possible, contractors need not correct surface inaccuracies by costly methods, and engineers have the assurance that surface specifications are mechanically accurate.

Write today for bulletin giving complete information.

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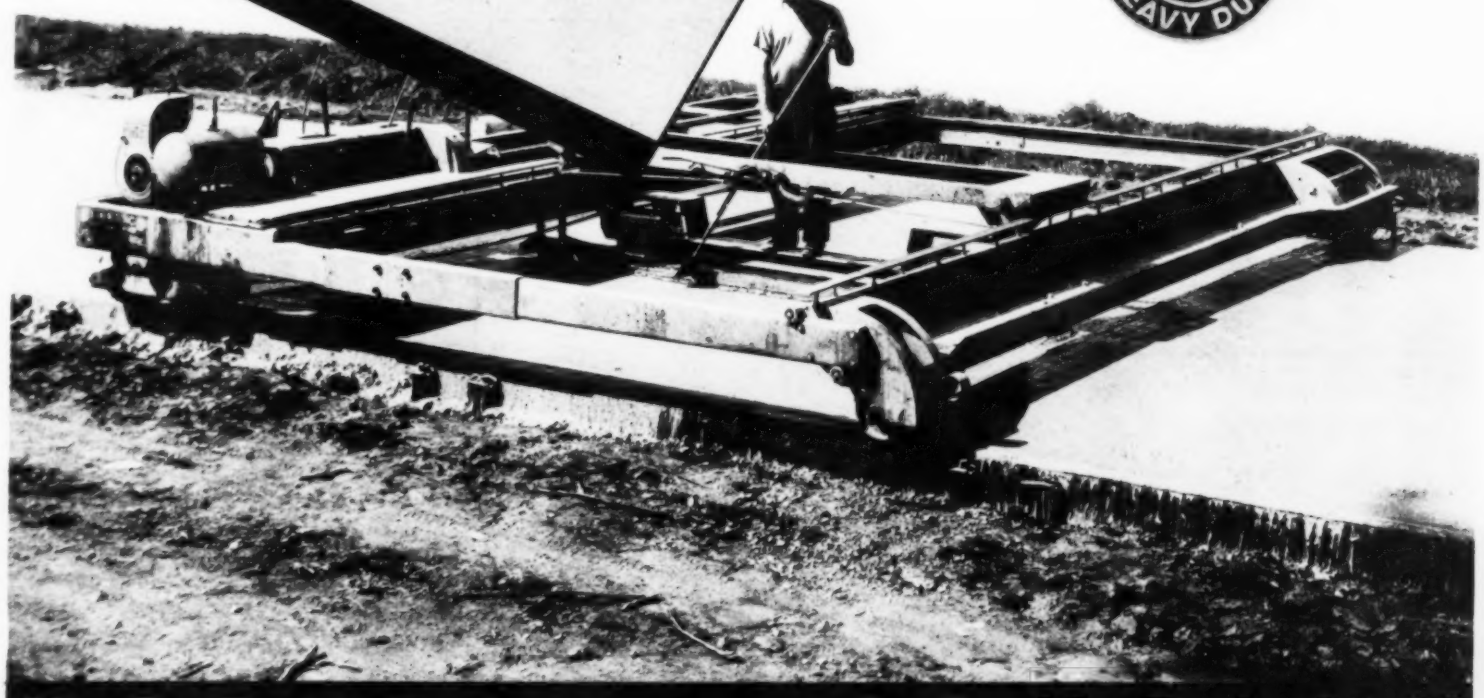

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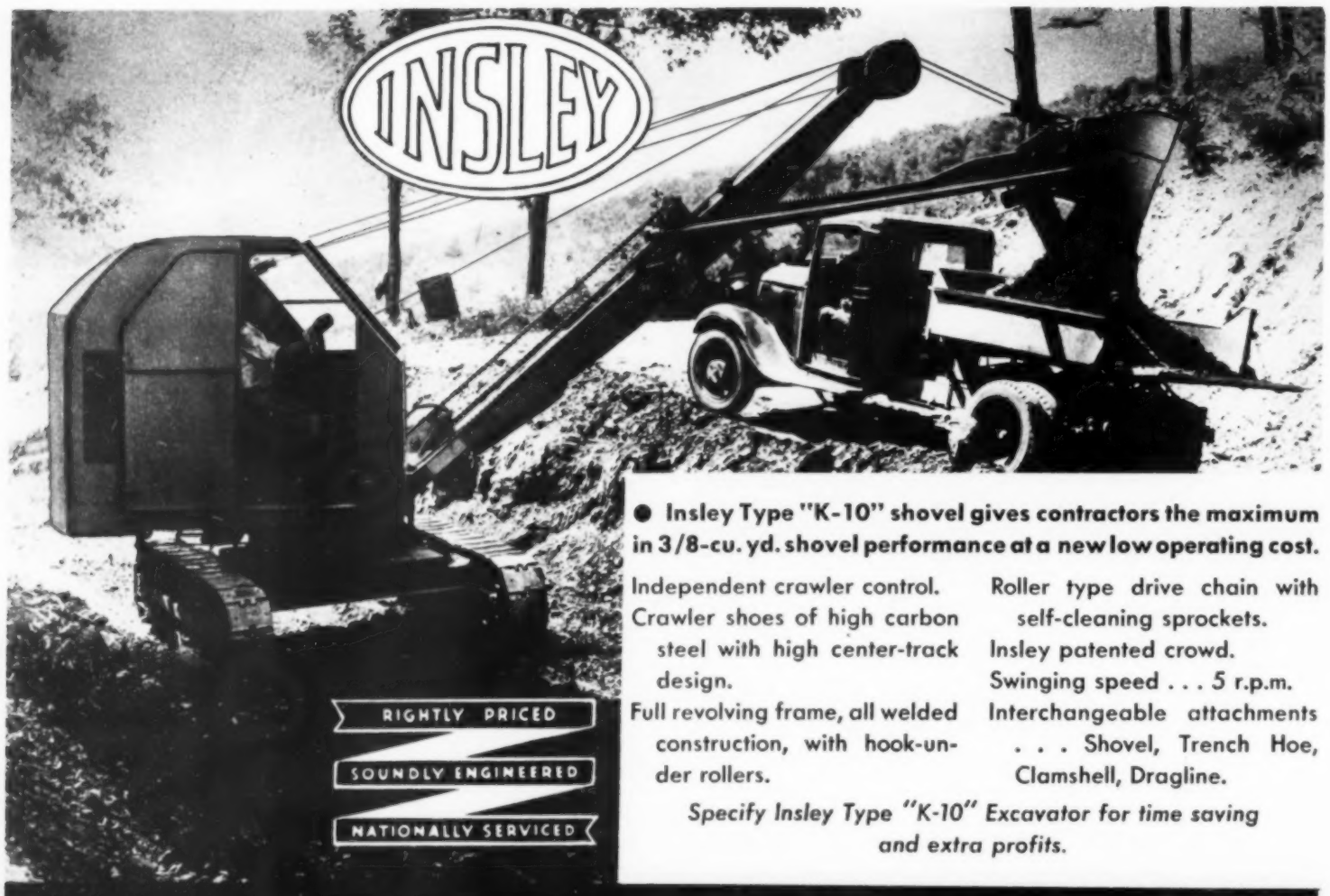

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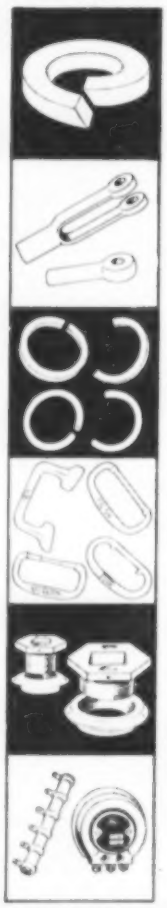

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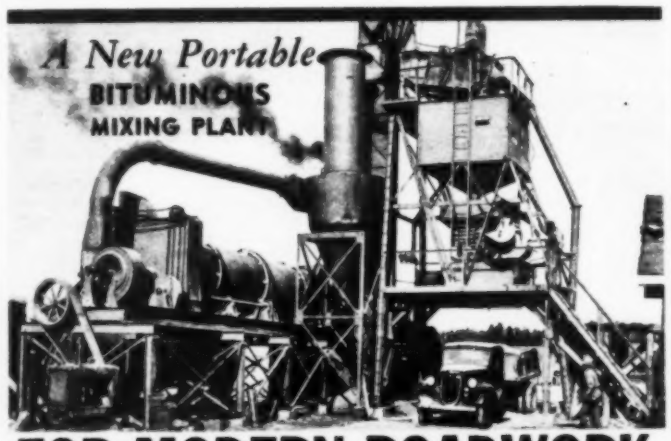

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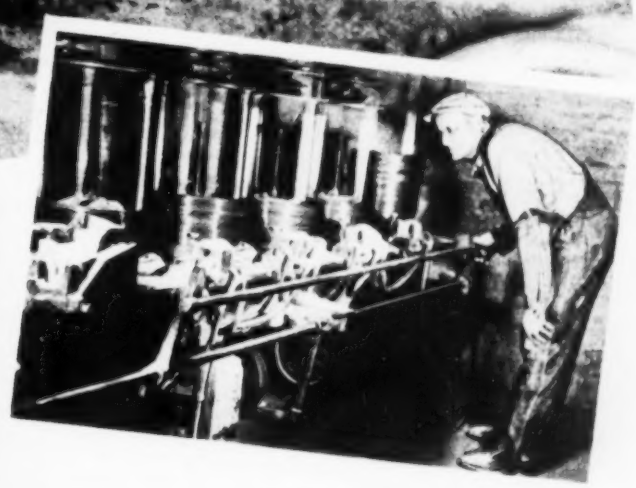

The cold drawing of wire increases strength and toughness of finished rope . . .

● Here you see one of the most important steps in the manufacture of the wire used in Macwhyte PREformed Wire Rope. Wires are "drawn" through from 4 to 8 dies to make them the exact diameter required.

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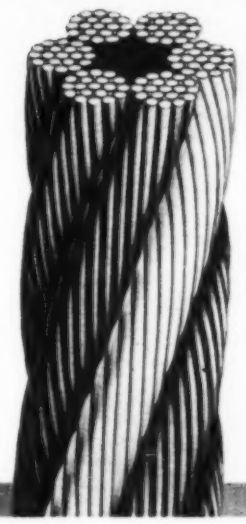

Monarch WHYTE STRAND PREformed Wire Rope...specially designed for jobs where ropes must stand up under severe bending. Macwhyte manufactures special constructions for shovels, draglines, cableway excavators, scrapers, loaders, mixers, pavers, incline hoists. Macwhyte also makes specially designed non-preformed wire ropes.

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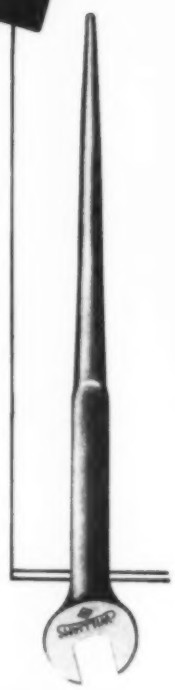
Where human life and safety depend upon wrenches, don't take chances on inferior quality.

Take Williams' Structural Wrench above, for instance . . . well proportioned, nicely balanced with long, narrow jaws that "hang" onto a square nut while it's tightened. The abrupt offset of handle protects the operator's knuckles. Openings milled slightly oversize to accommodate rough bolts and nuts. Drop-forged from a fine grade of special carbon steel and carefully heat-treated.

In Williams' Construction Wrenches, illustrated at the right, you find the same dependability. Both types with openings up to 2-1/16". Ask your distributor for these dependable, fully guaranteed Wrenches.



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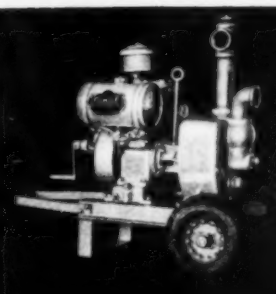
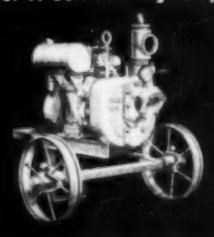
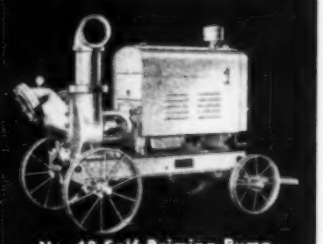

No. 41 Self-Priming Pump


No. 42 Self-Priming Pump


No. 48 Self-Priming Pump

"Your pumps and points proved very satisfactory. We would not have any hesitancy in recommending your equipment in any line of construction work that requires wellpoints."

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The ground was tough and the installation difficult. But, the patented DOUBLE VALVED MORETRENCH WELLPOINT, forcing all of the water out of its tooth armored tip, washed and ground the toughness away and *that is one of the many reasons why the system "proved very satisfactory."*

Wellpoints that try to get by with a single valve waste plenty of valuable time because half to all of the jetting water escapes (A.W.O.L.) by the unvalved and therefore unprotected mesh entrance and *that is one of the many reasons why such points are never correctly installed.*

THANK YOU, MR. FRY — YOU KNOW THE DIFFERENCE.

P. S. The City of Muskegon has recently ordered a Moretrench Wellpoint System for its trunk sewer project.

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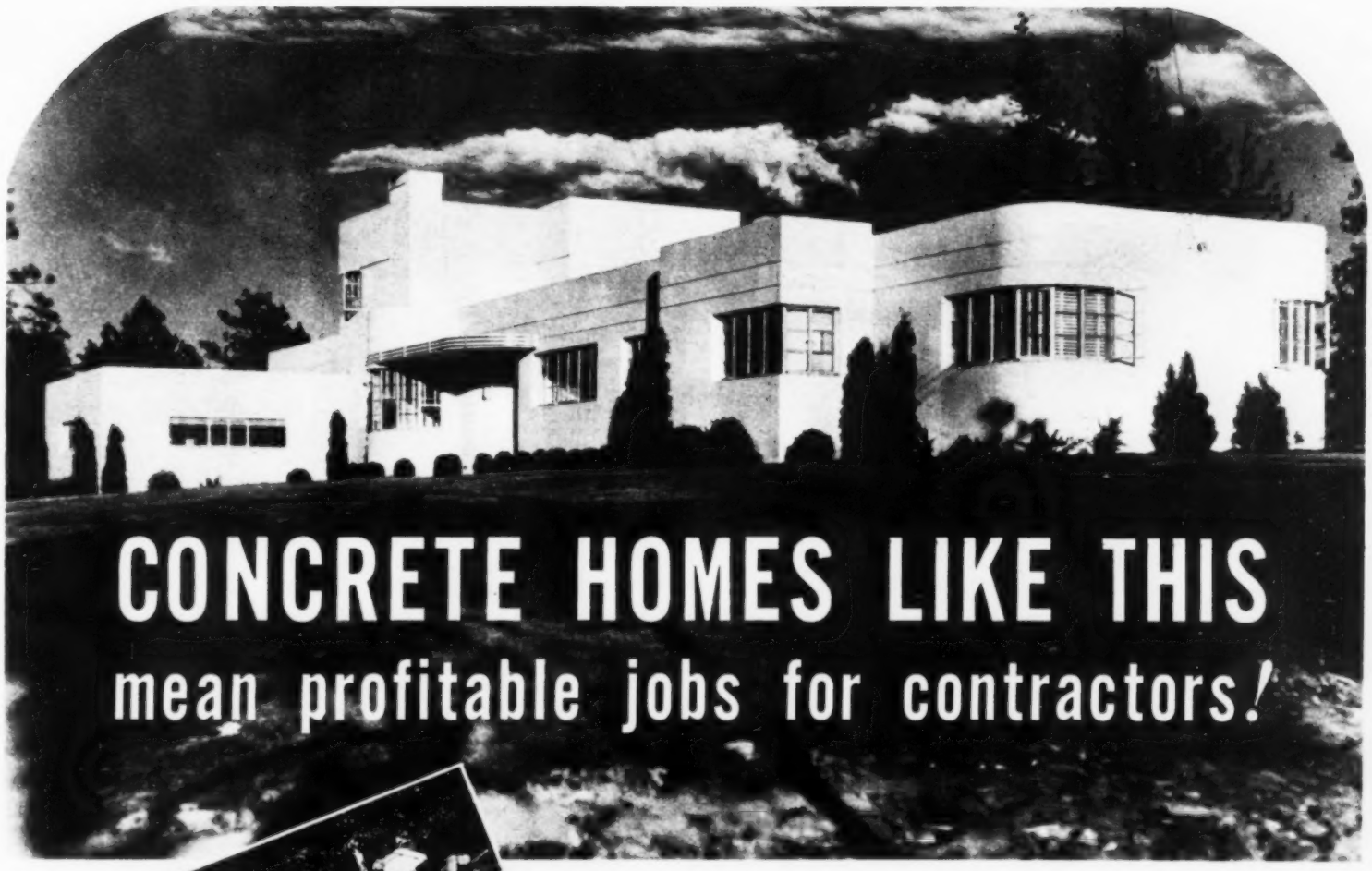
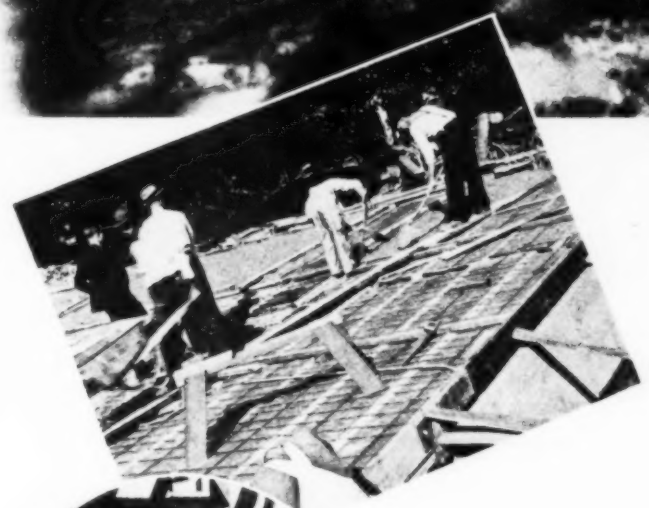
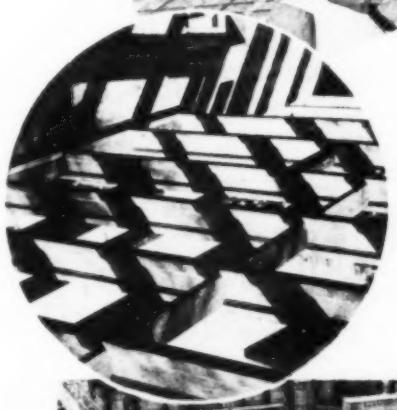
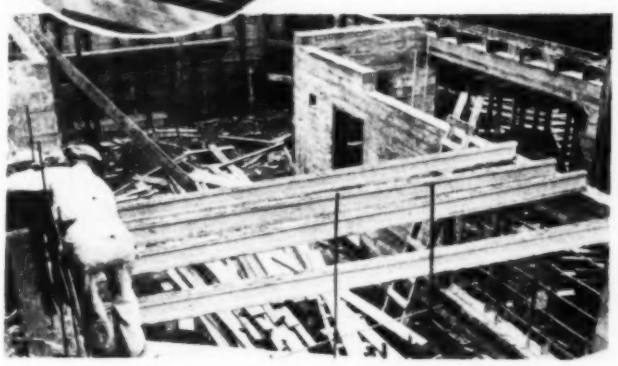


CONCRETE HOMES LIKE THIS
mean profitable jobs for contractors!





Construction view of residence of J. B. Loughary, Seattle. Architect: William J. Bain. Builder: Ray McCoy. Concrete first floor; concrete walls; reinforced concrete foundation.



Two construction views of another Seattle house showing details of precast concrete floor joists. Architects: Paul Thiry and Alban Shay. Contractor: Hainsworth Construction Co.

Kirk Thompson residence, Spokane, Washington. Architect: G. A. Pehrson. Builder: Earl Cummings. Reinforced concrete walls.

All over the country, large houses and small, in single units and by the dozens, are being built with concrete. It's a growing market that offers real opportunity to the contractor. *You* can cash in on it — either independently or by making cooperative arrangements with one of the realtors or subdividers who is setting up a construction department or seeking a connection with a builder.

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They will save you time and money in cutting reinforcing fabric or rods—trimming off tie-wires after removal of forms—cutting bolts or chain—splitting nuts—cutting wire rope. One or more PORTER TOOLS will "earn their keep" on any contracting job.

Shown here is the PORTER SWIVEL HEAD CUTTER—the "wrist-action" tool that reaches over, under or around obstructions. Head swings 90° to either side, and cuts with full power in any position. Also made in rigid type, for a variety of special uses.

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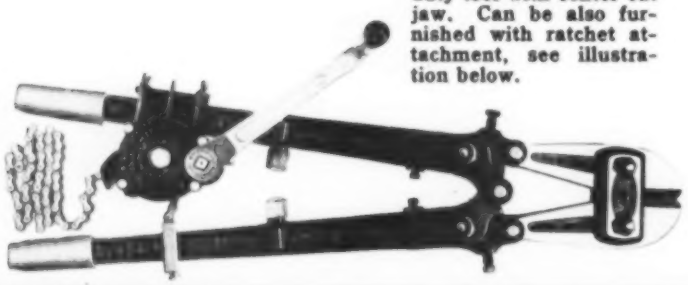

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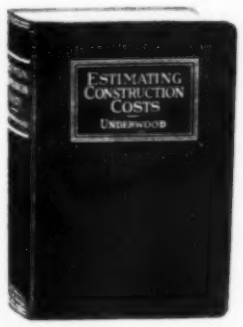

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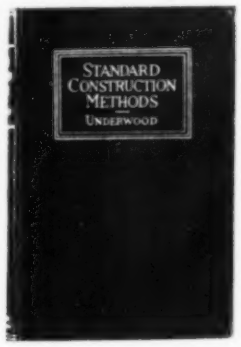
Standard Construction Methods



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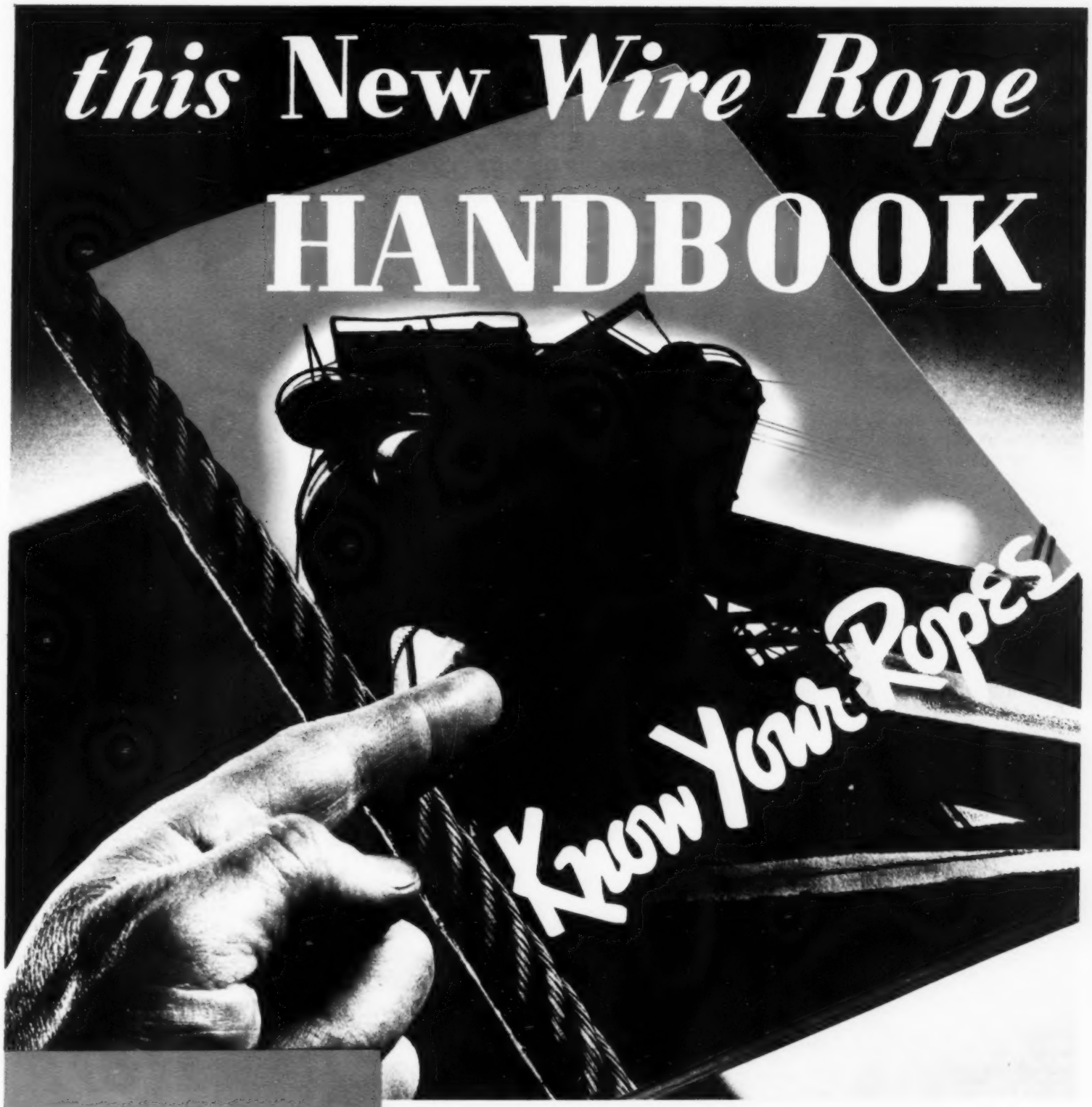

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*An actual case history from Shell's files.

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Shell engineers and scientists have developed Diesel lubricants for every application. There remained only the problem of putting the right oil in the right place. The Shell engineers did just that!

One year of *continuous* operation was the result. Not one minute's delay due to shutdown . . . Not one cent spent for replacement of parts because of faulty lubrication . . . The job completed weeks ahead of schedule!

The ingenuity and foresight of Shell men, the high-quality products at their command, are available for your needs. As they have met thousands of other tough lubricating problems . . . they will meet yours.

* * *

Simply address your nearest Shell Office: Industrial Lubricants Division, Shell Building, San Francisco; or Shell Building, St. Louis; or 50 West 50th St., New York.

SHELL

SHELL DIESEL LUBRICANTS

"RELIANCE"

a ***complete***

ROCK CRUSHING PLANT

mounted on a 4 wheel truck

COMPACT . . . RUGGED . . . STABLE . . . *and*

profitable!

It's complete — and it's ready to operate! Features include *low feed opening,* sufficiently far from balance wheels for safe and easy hand feeding. Drive from engine to crusher is V-Belt. Engine has clutch for easy starting. Unit furnished with or without elevator. Chute screen if wanted, or portable bin with revolving screen. *Easy to move* — because of roller bearing wheels and low center of gravity.

A typical UNIVERSAL VALUE — which means not the cheapest but REAL QUALITY. Backed by 30 years experience. Write for Catalog and prices.

SHOWING UNIT WITH FOLDING ELEVATOR

WE OFFER A COMPLETE LINE OF

Rock Crushers • Street Sweepers • Wash Boxes • Bucket Elevators
Storage Bins • Feeders • Revolving Screens • Heating Kettles
Power Units • Belt Conveyors • Sand and Gravel Spreaders

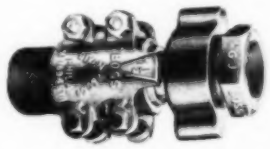
UNIVERSAL
ROAD MACHINERY COMPANY
Kingston, New York

BETTER PERFORMANCE
LONGER SERVICE
ON ANY JOB

"DIXON" AIR HAMMER COUPLINGS

Designed and built to withstand the continual vibration of hand hammers and rock drills, this Dixon coupling has a longer, consistently economical service life on the toughest job. And, like the "Boss," it is rust-proofed by Cadmium Plating.

"BOSS" HOSE COUPLINGS



Used for steam hose, steam hammers, air, hydraulic or road builders' hose . . . "Boss" Couplings have no equal for dependability in service. Parts are of steel or malleable iron to withstand abuse . . . Cadmium Plated for rust proofing.

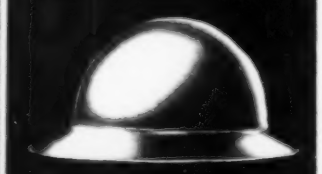
Furnished in Washer or Ground Joint Type.

DIXON
VALVE & COUPLING CO.
LOS ANGELES PHILADELPHIA HOUSTON

Carried in Stock by Leading Rubber Manufacturers and Jobbers.

THE WISDOM OF HEAD PROTECTION NEEDS NO PROOF

M·S·A SKULLGARDS



A collection of all M. S. A. Skullgards that have saved lives, reduced or prevented injuries would fill a museum! They're the most effective, the most widely used head protectors in the bridge, tunnel and general construction field. ● Unequalled in strength, cool comfort and durability. Non-softened by water or perspiration; non-conductive to electricity. Self-ventilating. Easy-fitting, replaceable sweatbands. Shock-absorbing hammocks in crown. Styles for every need or preference. ● *Let us arrange a demonstration.*

MINE SAFETY APPLIANCES CO.
Braddock, Thomas & Meade Sts., Pittsburgh, Pa.
District Representatives in Principal Cities

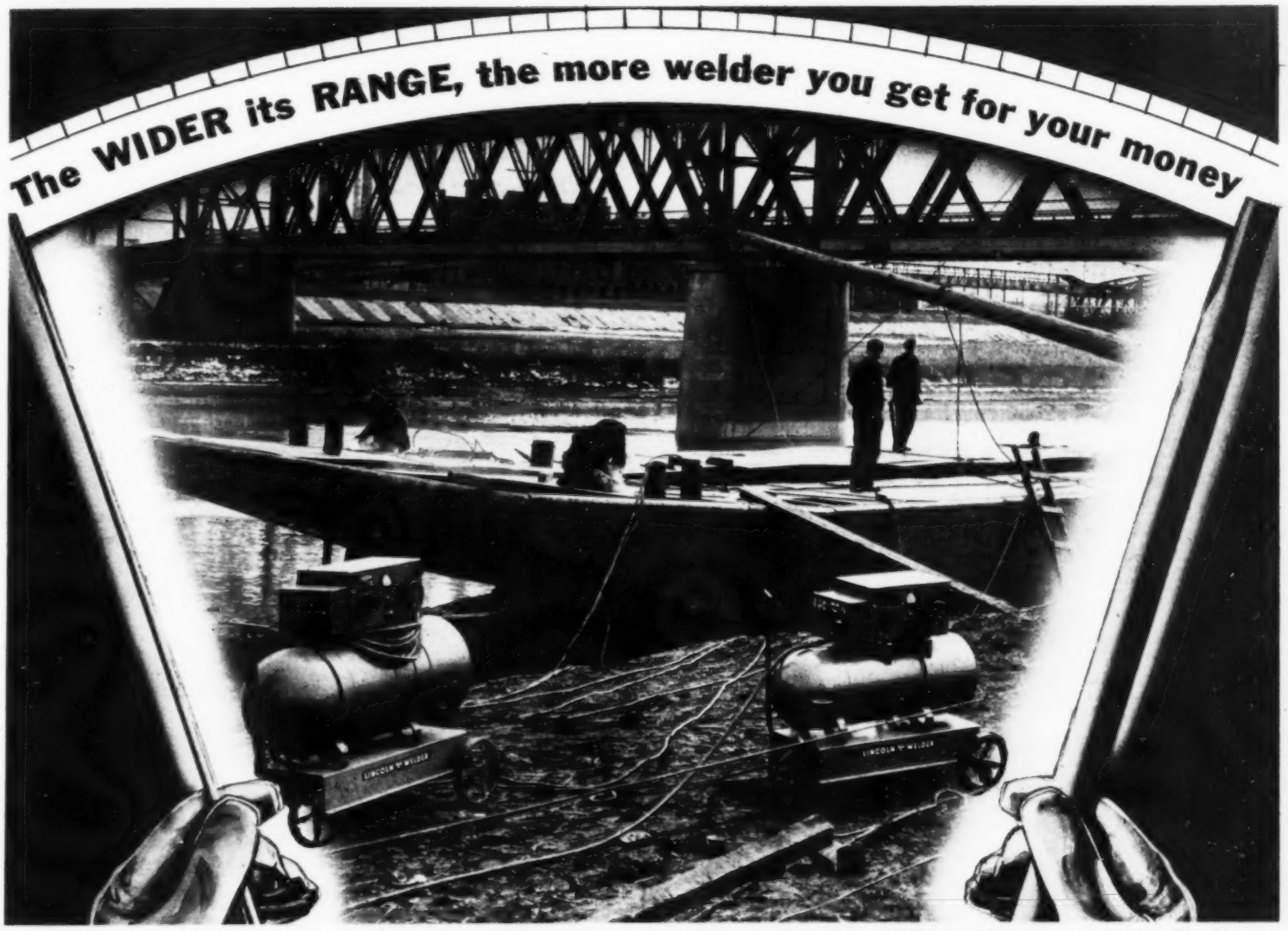


Photo and data courtesy of The Darby Corporation, Kansas City, Kansas.

On All Kinds of Work
THEY'RE GETTING BETTER WELDS AT LOWER COST

For what more could any welding user ask than, "We want welders that will put out the best welding in the shortest time at the lowest possible cost." That was the measuring stick used by this concern in picking the best buy for their welding dollar.

To make a long story short—they tried the New "Shield-Arc SAE"—and *they have replaced their entire fleet of welders with this new Lincoln.*

Much of their welding is out in the open—on boilers, tanks, barges, towers and stacks. On applications such as these, the new "SAE" wins by a mile because it can be set for a "rubber arc," permitting fast, high-quality work under windy conditions.

Other jobs, such as butt welds in heavy plate, call for a forceful, digging arc. The "job selector" of this new Lincoln gives them that type too, at any desired welding heat.

There is never need for a compromise arc with this new welder. You can tune in any TYPE or SIZE of arc for *any* job. It's as simple as a radio. Get complete details about this *accurate, broad-range* welder. THE LINCOLN ELECTRIC COMPANY. Largest Manufacturers of Arc Welding Equipment in the World.

LINCOLN "SHIELD-ARC SAE"

THE WELDER WITH DUAL *CONTINUOUS* CONTROL

THE LINCOLN ELECTRIC CO.
Dept. G-380, Cleveland, Ohio

☐ Please send me a free copy of Bul. 412.

☐ Please arrange a demonstration of the New "Shield-Arc SAE" Welder.

Name _____ Position _____

Company _____

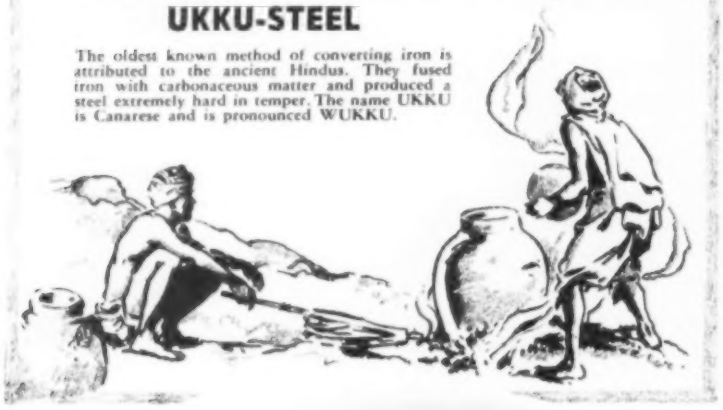
Address _____

City _____ State _____

IRON'S EVOLUTION

UKKU-STEEL

The oldest known method of converting iron is attributed to the ancient Hindus. They fused iron with carbonaceous matter and produced a steel extremely hard in temper. The name UKKU is Canarese and is pronounced WUKKU.



AND TODAY....

The WITHERBEE
SHERMAN CORPORATION
Produces a Rich Iron Ore...

— In great demand by modern industry and used in the making of many fine alloy steels. The underground workings of the Witherbee Sherman Corporation are located in northern New York State. For years they have yielded an extremely valuable iron ore known as Magnetite — an extremely hard ore, lying in rich veins entirely surrounded by rock. Naturally, this hard ore increases drilling and blasting problems — requires extreme efficiency throughout production cycles — close attention to details.

Ensign-Bickford Safety Fuse is used. It is a detail that can be depended upon to cooperate perfectly. A century of unrelenting care — a policy of never-ending research — contribute to its perfection.

Ensign-Bickford Safety Fuse offers the assurance of dependable blasting. It is always available in a number of standardized brands, each designed for a particular set of conditions . . . Write for a free copy of the Safety Fuse Book.

ENSIGN-BICKFORD SAFETY FUSE
THE ENSIGN-BICKFORD CO.
SIMSBURY, CONNECTICUT

SF64

K&E WYTEFACE

TRADE MARK

STEEL MEASURING TAPES

for visibility

Wherever measurements must be taken quickly and surely, the swing is to WYTEFACE. The high visibility of this white steel tape has won it an enthusiastic acceptance. If WYTEFACE offered no other advantages, this feature alone would gain it preference.

But beside its superior legibility, WYTEFACE has a marked resistance to kinks and curls, and a freedom from rust and corrosion that make it the logical choice for all types of service.

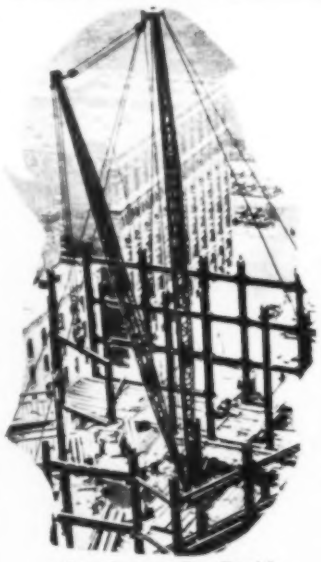
You'll want to own a WYTEFACE steel tape. Ask your dealer—or write for complete information.

EST. 1867

KEUFFEL & ESSER CO.
HOBOKEN, N. J.
NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO DETROIT MONTREAL

TRADE MARK
DOBBIE
ESTABLISHED 1862

All Steel DERRICKS



Steel Erectors Guy Derrick, with Ball Bearing Footblock.

Guarantee Safety

When you guarantee safety, you economize — for safety means uninterrupted operation and lowest possible maintenance costs.

And DOBBIE All-Steel Derricks have been designed for safety and consequent economy. They have a safe load capacity of almost twice their rating. You need this assurance of dependable safety and continuous performance.

SAVE POWER BY USING BALL OR ROLLER BEARING FOOTBLOCKS AND SHEAVES. Built in both Guy and Stiff-leg types. Write for information and prices.

DOBBIE FOUNDRY & MACHINE CO.
Niagara Falls, N. Y.

Other Dobbie Products—Steel Derricks, Timber Derrick Fittings, Hand Winches, Motor Driven Winches, Blocks, Sheaves, etc.

"TROUBLE IN MOROCCO"

Armored Trucks Plow Through Scorching Sand, Hurtle Desert Dunes

GOODRICH SILVERTOWNS FIND REAL WAR IN FILM THRILLER

by Lowell Thomas

"Diving down the banks of steep sand dunes, skidding with two wheels in the air, roaring over the flat stretches—it's a tough job for trucks and tires.

"When they filmed 'Trouble in Morocco' they had plenty of trouble getting motorized equipment that could travel the 'camel country.' I've crossed the Sahara. I know what a job it is to get through with even a light passenger car, crawling along slowly. When you take heavy equipment, push the accelerator to the floor, plow through burning desert sand, it's torture for tires!

"Believe me, there were plenty of thrills, hazards and perilous moments in making this picture.

"There was no place for sissies in the cast—and no place for 'weak sister' tires on the job."

Larry Darmour, producer for Columbia distribution of this feature picture starring Jack Holt, chose Goodrich Silvertowns for their armored cars. And many of Hollywood's largest studios use Goodrich Truck Tires for hauling cameras and delicate sound equipment. Where tires matter most, that's where you find Triple Protected Silvertowns.

Protects Against Blow-Outs

Every Goodrich Truck Tire has a new invention built into the sidewall—a 3-way check against blow-outs and sidewall breaks. This protection actually checks 80% of premature failures! It strikes right at the cause of tire delays. Here's how it works:

1 **PLYFLEX**—distributes stresses throughout the tire–prevents ply separation—checks local weakness.

2 **PLY-LOCK**—protects the tire from breaks caused by short plies tearing loose above the bead.

3 **100% FULL-FLOATING CORD**—eliminates cross cords from *all* plies—reduces heat in the tire 12%.

With that kind of cool-running tire you're bound to get greater mileage on any kind of haul. Goodrich can give you the exact type and size of tire for your particular service—and there's *no premium price to pay.* Call the Goodrich dealer.

Goodrich *Triple Protected* Silvertowns

SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES

SOIL STABILIZATION *with* Tarmac

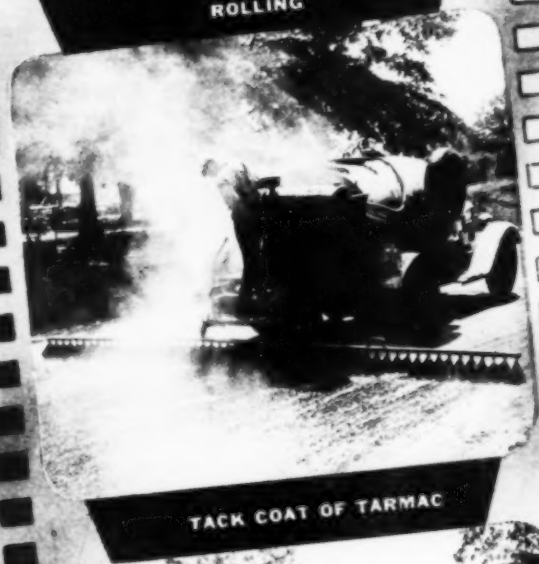
ORIGINAL SURFACE AFTER LIGHT RAIN

APPLYING TARMAC

ROLLING

SCARIFYING

MIXING WITH BLADE AND DISC



TACK COAT OF TARMAC

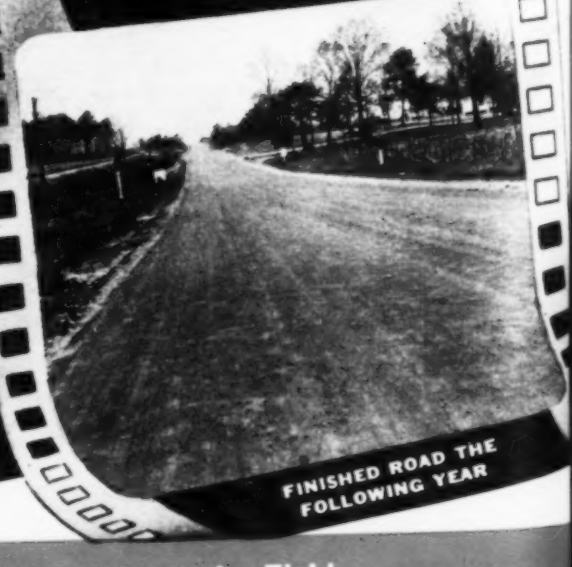
ADDING WATER

SHAPING AND COMPACTION

SPREADING SAND OVER TACK COAT

DISCING

SHAVING OFF SURFACE OF STABILIZED ROAD



FINISHED ROAD THE FOLLOWING YEAR

Koppers Divisions, Subsidiaries and Affiliates Serving the Public Works Field

TAR AND CHEMICAL DIVISION — PITTSBURGH, PA.
THE WOOD PRESERVING CORPORATION — PITTSBURGH, PA.
NATIONAL LUMBER & CREOSOTING COMPANY — TEXARKANA, ARK.
WESTERN GAS DIVISION — FORT WAYNE, IND.
BARTLETT HAYWARD DIVISION — BALTIMORE, MD.
AMERICAN HAMMERED PISTON RING DIVISION — BALTIMORE, MD.
THE KOPPERS COAL COMPANY — PITTSBURGH, PA.
NEW ENGLAND COAL & COKE COMPANY — BOSTON, MASS.
THE MARYLAND DRYDOCK COMPANY — BALTIMORE, MD.
THE WHITE TAR COMPANY OF NEW JERSEY, INC. — KEARNY, N. J.

KOPPERS

DESIGNERS · BUILDERS · PRODUCERS · MANUFACTURERS · DISTRIBUTORS · OPERATORS

THE MOST WIDELY DISCUSSED SUBJECT IN ROAD CONSTRUCTION

SOIL STABILIZATION WITH TARMAC

The need for stabilized sub-grades without the addition of large quantities of aggregate is widely recognized.

Soil compacted at its optimum moisture content can support ordinary traffic without being displaced. However, as it is almost impossible to control the moisture content of the soil, it is necessary to stabilize it by some other method. Tar has proved to be particularly well adapted for this purpose.

Soils containing as high as 70% of 200-mesh material have been successfully stabilized with Tarmac. The photos show the step by step procedure in stabilizing a road containing approximately 35% silt and 22% clay.

This Highway Culvert Is Protected with Koppers Dampproofing—Costly damage to concrete and masonry structures can often be prevented by the use of Koppers Waterproofing or Dampproofing. These treatments are applied to bridge floors, retaining walls, foundations and other structures which are subjected to water. Send for the booklet which describes waterproofing and dampproofing methods.

This 60-inch WESTERN Water Valve Needs No Rollers, Scrapers or Tracks for the Valve Discs—Photo shows a WESTERN Valve being installed in a horizontal position at Cincinnati.

The WESTERN Type A Waterworks Valve has its discs suspended at the center and this permits free rotation in opening and closing. The central application of closing pressure to the disc gives a uniform distribution of the closing pressure at all points on the outer perhiphery of the disc where the disc and body faces come in contact and this means a tight valve.

Koppers Is One of the Principal Suppliers of Coal and Coke—The Koppers Coal Company operates 25 mines in the high volatile and low volatile fields and there is a Koppers coal for every purpose. Koppers also operates large coke plants and carries stocks of Koppers Coke in many of the large centers of population.

The Wood Preserving Corporation's Pressure-Treated Timber Used to Rebuild the First Pile Bridge in America—These photos show the new Sewalls Bridge, at York, Maine, as rebuilt with pressure-treated creosoted timber supplied by this Koppers subsidiary. The original bridge was designed and built by Major Samuel Sewalls in 1761 and is believed to have been the first bridge in America which rested on piling.

DUFF-NORTON

Standard or Special Lifting **JACKS** *for every purpose*

WHETHER the job calls for lifting or lowering . . . pushing or pulling . . . holding or moving—you will find in the Duff-Norton Line of Jacks, a type and capacity to meet every requirement from one to one-hundred tons or more.

Duff-Norton Jacks are the product of more than 50 years of specialization . . . used and preferred the world over in railroad construction, bridge building, excavating, mining, oil well operations, telephone cable work and automobile and truck repair.

Outstanding quality, strength, simplicity, safety, ease of operation and long life are general features of Duff-Norton jack design that have established Duff-Norton as the world's oldest and largest manufacturers of lifting jacks—sold and recommended by Mill and Mine Supply dealers and jobbers everywhere.

SPECIFY DUFF-NORTON AND GET THE BEST!

LISTEN IN
Every Friday Nite at 7:45 P.M., E.S.T.
"The House That Jacks Built"
RADIO PROGRAM
WEAF, New York, WMAQ, Chicago, KDKA, Pittsburgh
Entertainment that Construction Engineers Like!

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.
Branch Offices in Principal Cities

"THE HOUSE THAT JACKS BUILT"

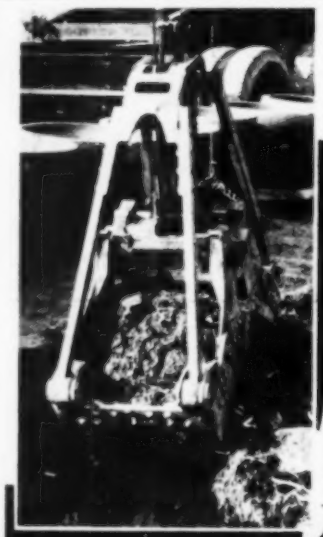
SMOOTHER ROADS

. . . Laid faster than most plants can mix—

New Paving Catalog PM-37 describes valuable operating advantages of the Jaeger Paver including latest improvements — Heated Screeds, Oscillating Blenders, improved Screed Design. Write for it today.

THE JAEGER MACHINE CO.
800 Dublin Ave., Columbus, Ohio

JAEGER *Bituminous* **PAVER**



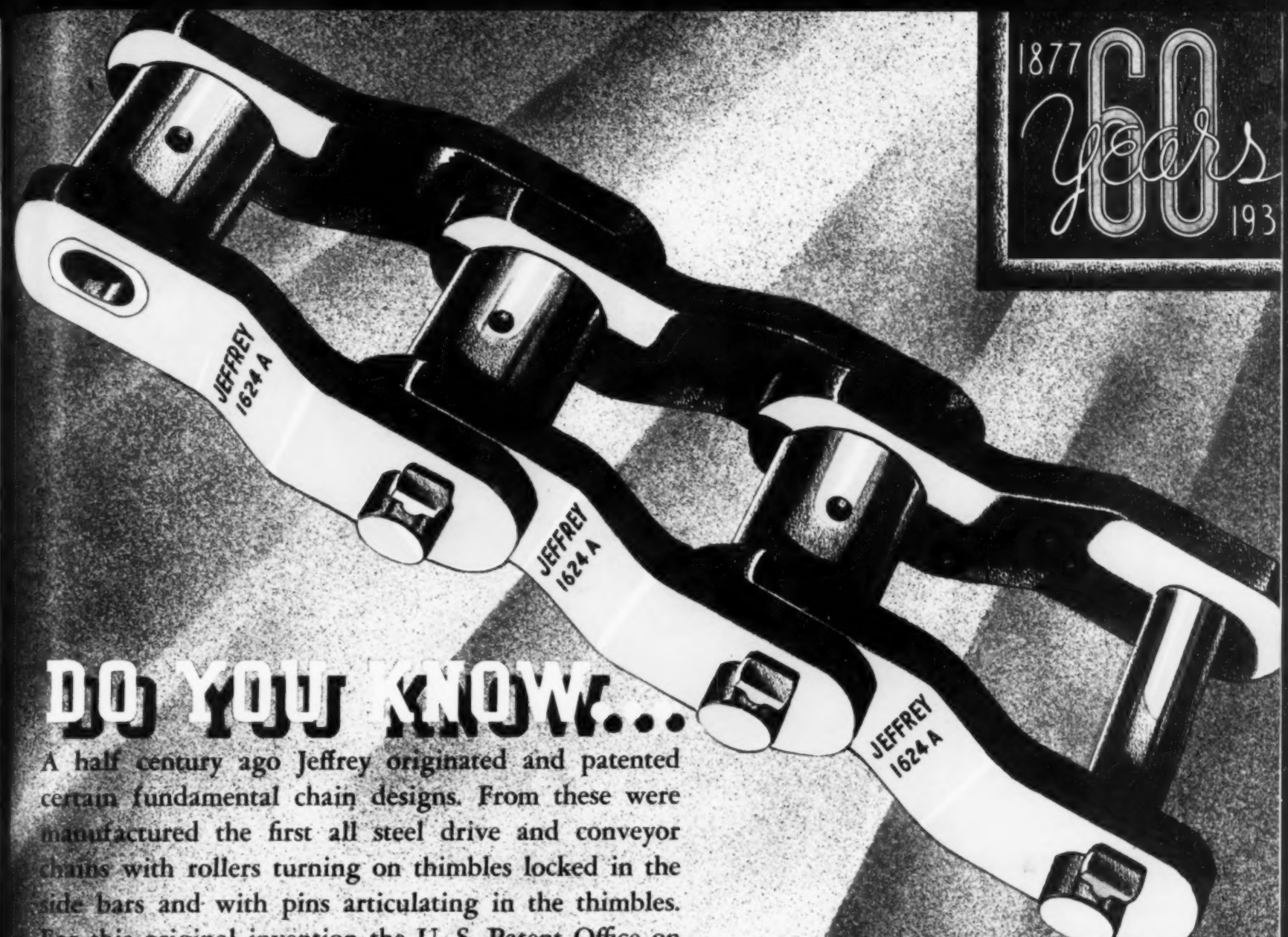
The faster digging multiple Rope Bucket

The DOUBLE HINGE . . . . . .

DOUBLE HINGE gives you a more rigid construction, greater digging strength, and longer spread of the open bucket. *Write for bulletin.*

THE WELLMAN ENGINEERING CO.
7017 Central Avenue, Cleveland, Ohio
Distributors in Principal Cities

WILLIAMS *Buckets* POWER-ARM, POWER-WHEEL MULTIPLE-ROPE, DRAGLINE



DO YOU KNOW...

A half century ago Jeffrey originated and patented certain fundamental chain designs. From these were manufactured the first all steel drive and conveyor chains with rollers turning on thimbles locked in the side bars and with pins articulating in the thimbles. For this original invention the U. S. Patent Office on November 29, 1887, granted Patent No. 373,983 on "Chain and Chain-Making" . . . to Joseph Andrew Jeffrey, founder of the Jeffrey Manufacturing Company. These chains, which Jeffrey expressively names the STEEL THIMBLE ROLLER type . . . STR for short . . . have survived the tremendous changes in power transmission and conveying ideas of industry during the past 50 years. Maximum strength and minimum weight, with renewable parts make their use a real economy.

When you have need for such chains . . . call on Jeffrey, their originator.

The Jeffrey Mfg. Co.

Columbus, Ohio
Sales Offices in Principal Cities

Reproduced below is the Steel Thimble Roller Chain for which the original patent was granted.

UNITED STATES PATENT OFFICE

JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

CHAIN AND CHAIN-MAKING.

SPECIFICATION forming part of Letters Patent No. 373,983, dated N

Application filed August 22, 1887. Serial No. 247,542. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. JEFFREY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Chains and Chain Making, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a face view of a strip of steel, wrought iron, or other suitable metal, from which may be cut side bars adapted for my improved chain. Fig. 2 is an edge view of Fig. 1. Fig. 3 is a view of one of the finished side bars. Fig. 4 is a section of Fig. 3. Fig. 5 is an edge view of Fig. 3. Fig. 6 is a plan view of two of the bars in position. Fig. 7 is a side view of a tube from which can be cut the thimbles or tubular end bars. Fig. 8 shows a thimble ready for insertion. Fig. 9 is a view of a link after the parts have been ... ther. Fig. 10 is a side ...

After these thimbles are ... they are inserted in th... fastened by riveting or ... ing, sweating, or any ... ening together two pie...

At *c* I have shown ... the notch or key-s... there may be a corres... end of the thimble, ... means a rigidity of ... this thimble become... link. At the oppo... bars are provided ... or both of which m... or key-seats *d*.

E is the pintle ... throughout, e... provided ...

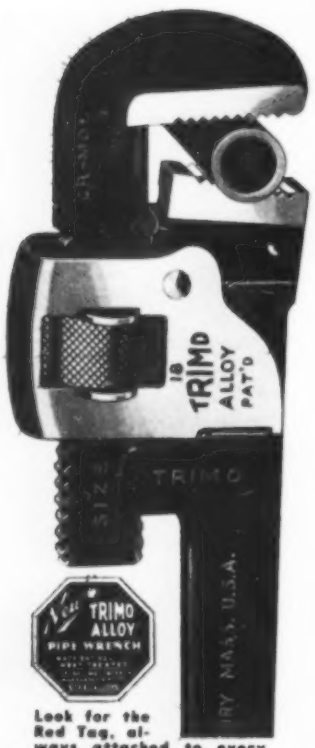
*tough going - but the Michigan is tougher!

Michigan Shovels are built for frozen ground — soft fills — gravel pits — rock quarries — mud — in fact, for anywhere a truck can navigate! . . . Although constructed for heavy duty and long life, the Michigan is not a ponderous, slow-moving machine. Its 25 mile-per-hour road speed gets it on the job and **earning** long before heavier equipment could be transported — and at a fraction of the cost . . . Model T-6 is faster in operation, too, due to fingertip air-controlled clutches and full-circle loading . . . Michigan's quick convertibility solves more of today's construction and maintenance problems than any other like equipment . . . Get Bulletin "CM". Write —

MICHIGAN POWER SHOVEL CO., Benton Harbor, Mich.

Just look! at that
RUGGED FRAME
made of
HIGH TENSILE STEEL
– double the strength of ordinary frames.
Typical of the
BALANCED STRENGTH
found throughout
the MICHIGAN

DEVELOPED THROUGH 50 YEARS TO MEAN A GREAT NAME IN WRENCHES



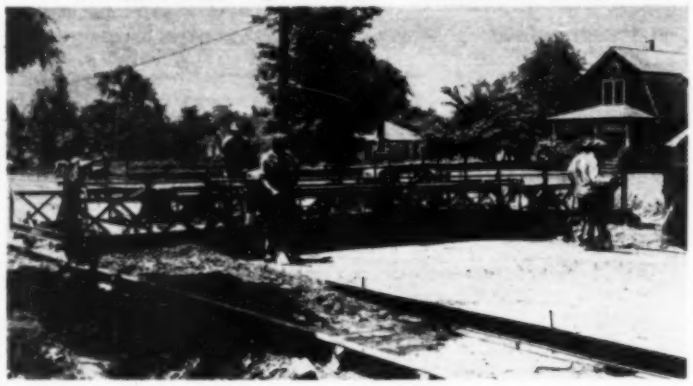
Look for the Red Tag, always attached to every Trimo. Your identification of Trimo Quality.

TRIMO

Made throughout of Chrome Molybdenum Nickel Alloy Steel — and DROP FORGED. Trimo gives a tighter grip—a quick release.

TRIMONT MFG. CO., Inc.
Roxbury (Boston), Mass.

"THERE'S A REASON"



Why is it that in States where "FLEX-PLANE" joints are used you find better roads?

There's a reason—let us tell you why, also why you should use "FLEX-PLANE" finishing machines with a wide screed.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN • OHIO

THIS COMPLETE LINE OF DEFENSE . . .

WILL PROTECT YOUR COST SHEET!

REX CONSTRUCTION EQUIPMENT

A TOUGHER, FASTER LINE FOR PUMPING, MIXING AND PLACING

. . . Chain Belt's line of Rex Construction Equipment is a line of real veterans . . . backed by over 25 years of front-line experience in a successful battle for concrete mixing, placing and pumping supremacy . . . From the smallest Rex Speed Prime Pump to the mighty Paver—each one knows its job thoroughly . . . has the resourcefulness—the dependability—and the "stuff" to see your job through and *bring home the profits.* Send for our 1937 bulletins—get complete details on the Rex way to lower operating costs on any construction job.

CHAIN BELT COMPANY, 1664 W. Bruce Street, Milwaukee, Wis.

REX

CHAIN BELT COMPANY of MILWAUKEE

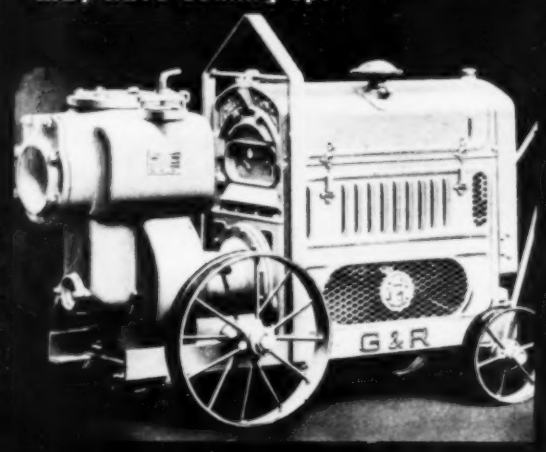
Construction Equipment

G&R PUMPS

handle MORE water - CANNOT CLOG!

See for yourself -

A G & R distributor near you is ready to give you the chance to check this pump against any job you may have coming up.



You are the best judge of what G & R Pumps are worth on *your* jobs. Let your own figures tell you whether you can longer afford to be without the G & R Pumps you need.

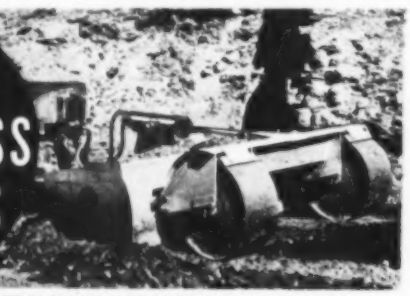
Everything we say about the time saved, the lowered operating costs and the volume of water handled by the G & R Self-Priming Centrifugal are simple, easily established facts. Look the pump over — see it work — check it by your own standards. When you know what you can get in pump performance with a G & R on the job, we doubt whether you will be satisfied with anything less.

Distributors in 100 Principal Cities.

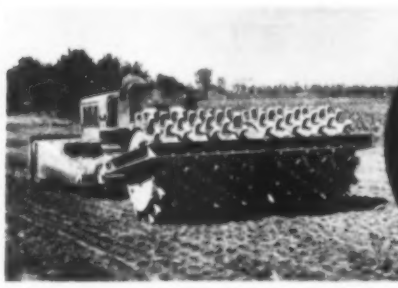
THE GORMAN-RUPP COMPANY—MANSFIELD, OHIO

BLAW-KNOX (Ateco)

BOTTOMLESS SCRAPERS



The Blaw-Knox (Ateco) BOTTOMLESS SCRAPER enables the contractor to operate his dirt moving job on a definite schedule and at a profit. It keeps dirt moving costs down.



BLAW-KNOX (Ateco)

TAMPING ROLLERS

Tamp as you roll with a Blaw-Knox (Ateco) TAMPING ROLLER, a remarkably efficient and economical device for compacting heavy and light earth fills of every description. Meets requirements of all State and Government specifications.

Send for descriptive catalogs

BLAW-KNOX COMPANY
2086 Farmers Bank Bldg, Pittsburgh, Pa.

Please send —CATALOG No. 1540—Blaw-Knox (Ateco) BOTTOMLESS SCRAPERS ☐

Please send —CATALOG No. 1550—Blaw-Knox (Ateco) Sheepsfoot TAMPING ROLLERS ☐

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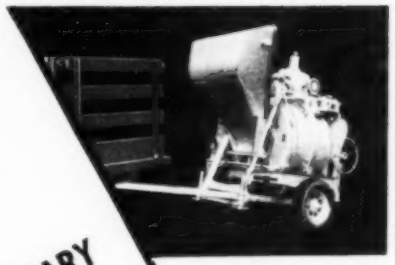
Company _____

Street _____

City _____ State _____



2 WHEEL END DISCHARGE TRAILERS
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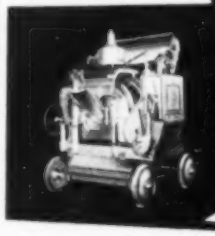
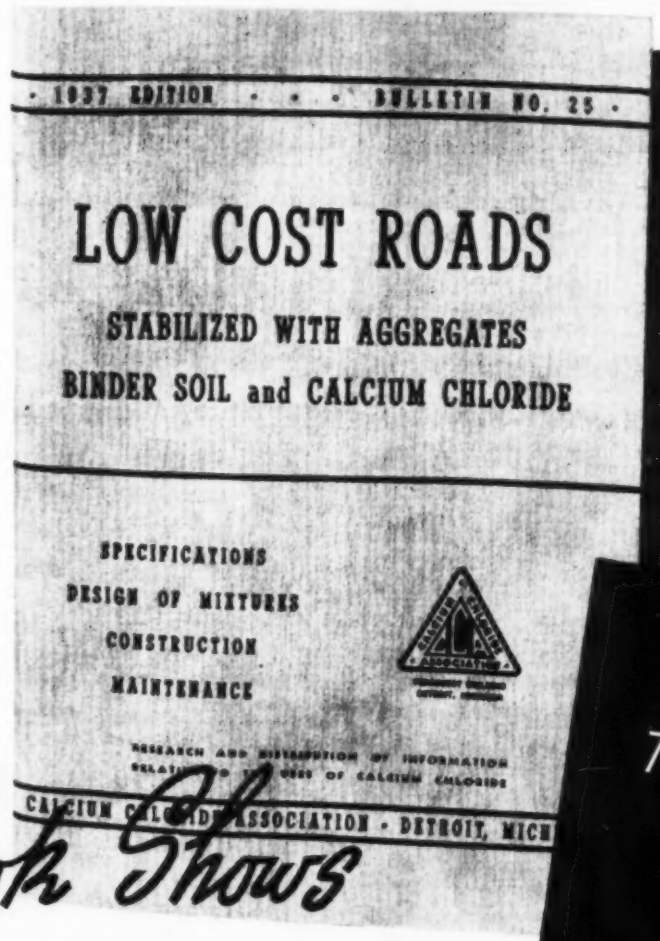
Crammed with pictures of the latest equipment. Sensational improvements — new items — more profits for builders. Get your copy today — It's FREE!

4 WHEEL END DISCHARGE PORTABILITY WITH STABILITY
7s — 10s — 14s



A complete line of modernized equipment for 1937 — new CMC Mixers —all sizes. "Dumpover" Pneumatic Tired Concrete Carts — Hoists — Pumps — Saw Rigs — Wheelbarrows. All engineered for faster work. Write for prices.

CONSTRUCTION MACHINERY
WATERLOO, IOWA



86 PAGES
75 PICTURES
CHARTS
TABLES
SPECIFICATIONS

This Book Shows

HOW TO BUILD
YEAR 'ROUND—LOW COST
CALCIUM CHLORIDE STABILIZED SOIL ROAD

SOIL-STABILIZATION, pronounced by government and state officials as the greatest discovery in highway construction in years, permits the building or improving of secondary roads with local labor from local materials, at the lowest possible cost.

This book describes in detail the principles of stabilization with calcium chloride, and gives specifications for binder soil, fine and coarse aggregates mixtures. It tells how to find, test, proportion and bind these materials. It gives information on drainage, crown, maintenance. Full of photographs, charts, tables, testing methods, and general data, it is a book that every highway official will want—a book he can depend upon—a book that will save him much time and money, give him more good roads for less money.

Your copy awaits your inquiry. Write for it today to any of the member companies listed.

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The Columbia Alkali Corporation . . . . Barberton, Ohio
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Michigan Alkali Company . 60 E. 42nd St., New York City

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FOR STABILIZING ROAD SURFACES

KEEP GOING WITH Snap-on Tools

Powerful leverage needed here — no mere "twist of the wrist" will budge those clay-coated, rusted-on track adjustment nuts.

So, again, Snap-on's Heavy Duty Boxocket wrenches get the contract . . . one or two good swings set the nut down tight.

Boxockets handle the tough jobs as well as taking the accessible nuts more easily. Snug-fitting Boxockets get in where end wrenches can't. No thick hefty end wrench jaws, but thin walls for nuts with limited clearance . . . and double broached hexagon boxockets require only half the handle turning arc needed with single broached wrenches.

They don't slip off under a heavy pull, because they grip firmly on all six sides. Double broaching and chamfered edge allow the wrench to slip on easily.

Blue Point Boxockets are made in a range of sizes and styles to fit all wrench requirements.

"Keep going with Snap-on Tools" . . . over 1600 in our FREE 120-page catalog. Only trained, experienced service-tool specialists sell Snap-ons direct to you . . . the coupon will bring the one nearest to your office or your job.

23 SIZES OF OFFSET AND STRAIGHT INTERCHANGEABLE BOXOCKETS — FIT ANY HANDLE 15" TO 42".

Snap-on Tools, Inc., Kenosha, Wis.

SNAP-ON TOOLS, INC., Kenosha, Wis.
Without obligation

- ☐ Have representative call and demonstrate .....
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Name.....
Firm.....
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Try . . . you'll buy!

More Power ★
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Less Labor ★
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Less Cost ★

Ratchet Lever Hoists
Load Binders

● Here's another remarkable Coffing Specialty for pulling forms, stakes and for those other troublesome jobs, which only the road builder knows. The hoist, being detachable, can be used in any number of places where a portable hoisting or pulling tool is required.

● The picture tells the story of its simplicity — its rugged strength — and suggests only one of the many ways you can use it, to save time and labor. Like all COFFING HOISTS, it's precision-built, tested to 100% over rated capacity — dependable!

COFFING HOIST COMPANY
DANVILLE ILLINOIS

A Simple But Efficient Small Gravel Pit Layout

1. HAISS LOADER and 1. HAISS PORTABLE CONVEYOR
Do all the work

The LOADER digs the material from the bank, the CONVEYOR elevates it to a gravity screen — and when trucks roll in, the LOADER walks around to the bins of graded sand and gravel and does the truck loading job . . . It's the worm-driven crowding speed and feeding propellers (Haiss patent) which give a Haiss Loader its power to *dig* in a gravel bank — or tackle other real work. Ask for Bulletins 134 (Loaders) and 1127 (Conveyors.)

GEORGE HAISS MFG. CO., INC.
139th St. & Canal Pl. New York
Represented in all Principal Cities

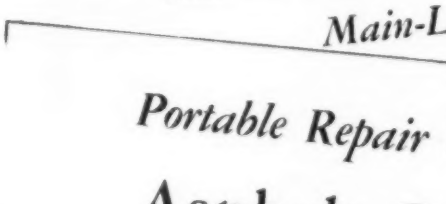
ASK FOR BULLETIN 237 ON FAMOUS HI-POWER CLAMSHELL BUCKETS

Step-by-Step
Handling Forms
By ADOLPH J. ACKERMAN

Step-by-Step Field Methods
Raised-Edge Curb for Concrete Pavement

Building Wreckers Develop
"Upside-Down" Method
of Orderly Demolition

HYDRAULIC BORING MACHINE
Installs Telephone Conduits Under
Main-Line Tracks of Railroad



Portable Repair Units Cut Costs of
Asphalt Cold Patches

PUMPED CONCRETE
Cuts Cost of Floors and Roof of
Five-Story Albany Post Office

STIFF-LEG DERRICKS
Handle Materials for
How to Increase Efficiency at the BATCHING PLANT

From a report by ANDREW P. ANDERSON Highway Engineer, Division of Maintenance

Planning and Planting
Medium-Sized Jobs

By J. B. BURGHARDT, Formerly Construction Superintendent for J. R. Hampton & Co., Inc.

HOW

. . .

The reading pages show you "HOW"—

The advertising pages show you "WHAT WITH"—

— a service combination hard to beat.

. . .

See page 3 for "HOW" items in the editorial pages.

See pages 123 and 124 for "WHAT WITH" items made by manufacturers whose advertisements appear in this issue.

If you do not find what you are looking for —

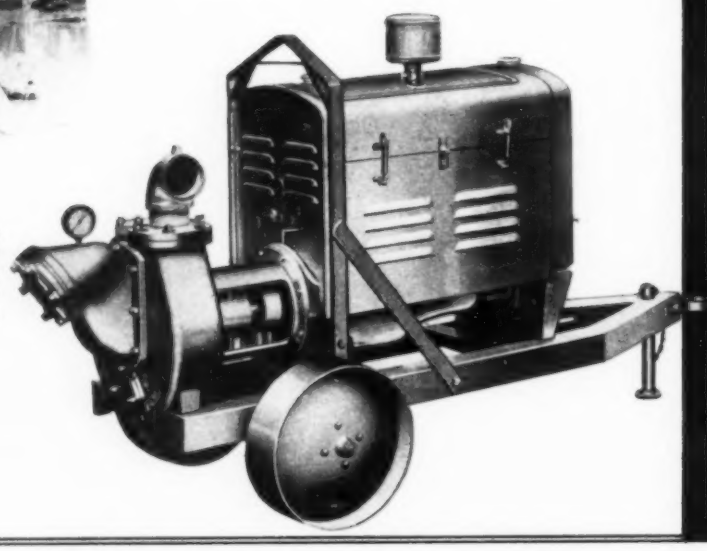
Write

Construction
Methods and Equipment
Information Bureau
330 West 42nd St., New York City

"STERLING PUMPS HANDLE 30% MUD AND SAND"

Before and After. The dependable performance of two 6" Sterling pumps saved a barge for Clyde C. Shackelsworth. Sterling pumps and contractors equipment can save you time and money. Ask for new catalog and recommendations for your jobs.

Be convinced! Read what Mr. Shackelsworth says about Sterling pumps. Use equipment used and recommended by leading contractors everywhere.



"Your pumps operated very successfully in raising sunken fuel barge using 60 feet of 6" suction hose with an approximate vertical lift of 15 feet pumping #5 fuel oil mixed with sand and river water. The oil viscosity was 55 seconds and 122° Fahrenheit, river temperature 70°. The pumps operated so well that we again used them in salvage operations in September, 1936, handling mud and sand of about 30% solids."

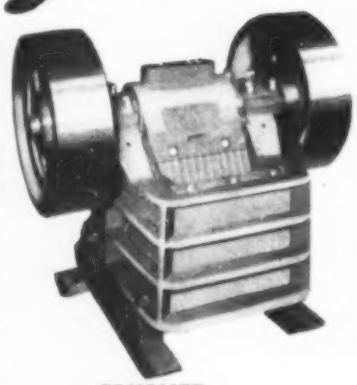
Sterling
MACHINERY CORPORATION
411-13 Southwest Blvd. Kansas City, Mo.

ROGERS
JOPLIN

The sign of . . .

Dependability

Our users will tell you about



CRUSHER
sizes — 6" to 36"

The Heavy Rigid Beds

The Big Shafts

The Long Bearings

The Perfect Running Balance

The Simplicity of Replacing Wearing Parts

The Unmatched Capacity

In fact more Crusher for your Dollar

ROGERS IRON WORKS CO.
JOPLIN • MISSOURI

Do You Know . . .

HOW THE MODERN CONCRETE ROAD PATCH IS MADE

. . . AND WHY?

VIBRATED CONCRETE ROAD PATCHES

This is HOW . . .

Large quantities of the old, broken concrete are cemented together with some new stone and vibrated with a high-powered vibrator.

And this is WHY . . .

To make an economical all concrete patch that can be opened to the heaviest kind of traffic in THREE HOURS!

WRITE TO
THE INTERNATIONAL VIBRATION COMPANY
16702 Waterloo Rd. Cleveland, Ohio

It's New!

The Ransome 27-E SINGLE DRUM PAVER with Finger Tip HYDRAULIC CONTROL

As the recognized pioneer in the concrete mixing and paving field, RANSOME has again blazed a NEW trail for the Paving Industry, by means of the revolutionary feature that means better control and smoother action

• HYDRAULIC CONTROL •

Less maintenance expense and lost time of paver due to the elimination of many parts.

Better control and smoother action of boom swing and power discharge.

Less strain on the operator which means greater efficiency on his part.

Lessening of accident risk with better control of boom swing.

Conversion of standard paver into a tower paver now simplified with the elimination of old boom swing mechanism.

Boom can be swung whether mixing drum is revolving or not.

Get full information about NEW Hydraulic Control and all the other RANSOME Superior Features that will increase your profits.

Write today!

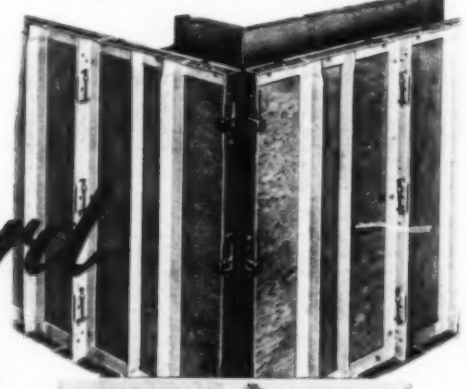
RANSOME CONCRETE MACHINERY CO.
DUNELLEN NEW JERSEY

87 YEARS EXPERIENCE AND STILL PIONEERING

UNI-FORM ENGINEERS

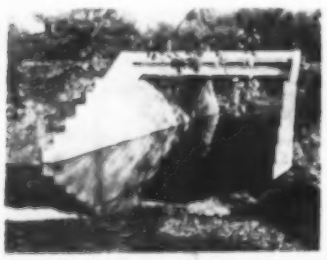
Are Sold On

SUPER-Harbord



More . . . more . . . More re-uses — that's what is selling contractors all over the country on the use of Super-Harbord Plycrete in the construction of concrete forms. It's one big reason, for instance, why the Universal Form Clamp Company uses Super-Harbord exclusively in building their UNI-FORM panels "for forming concrete walls quickly, accurately, and at a cost below other known methods."

Super-Harbord Plycrete is hot-prest with a resinoid bond insoluble in water. Plies *refuse* to separate even after 30 to 55 re-uses—and are *guaranteed not to separate*.



Numerous other advantages, too, make Super-Harbord superior in concrete form work. Large panels make forms go up faster — at less expense. Smoother surfaces and tight joints minimize costly rubbing and finishing. Laminated strength resists stress and strain.

Start now checking up your construction costs —

HARBOR PLYWOOD CORPORATION

Mills and General Offices, Hoquiam, Washington

Communications addressed to Harbor Plywood Corporation in any of the following cities will receive prompt attention:

BRANCHES — Atlanta, Chicago, Indianapolis, Milwaukee, Philadelphia, Pittsburgh, Cincinnati, Louisville, Jacksonville, New Orleans. REPRESENTATIVES—Cleveland, Columbus, Toledo, Baltimore, Washington, D.C., Worcester, Kansas City, Omaha, San Francisco, Los Angeles, Billings.

125 STRATEGIC CONSTRUCTION CENTERS

are covered in the classified business opportunities for Contractors — Manufacturers—Distributors, published in the

● Each center is covered by a resident reporter who reports on the territory surrounding his news center.

McGRAW-HILL CONSTRUCTION DAILY

mailed first class five times each week. Subscription $10.00 per month. Write for sample copies.

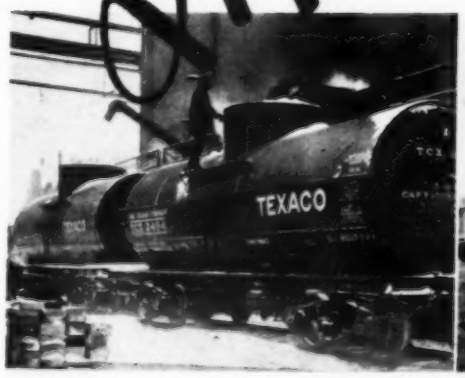
Business News Dept.

McGraw-Hill Pub. Co., Inc.

330 West 42nd Street

New York City, N. Y.

"Meet T.C.X. 2479"



Loading tank cars with Texaco Asphalt at the Providence, R. I. refinery of the Texas Company.

A string of tank cars delivering Texaco Asphalt for use in a large paving program in Evanston, Ill.

T. C. X. 2479 is a railroad tankcar of 10,000 gallons capacity. It is one of the cogs in the smooth-running TEXACO Asphalt delivery system. You may run across it almost anywhere.

During 1936, T. C. X. 2479 and the rest of the huge fleet of tankcars carrying TEXACO Asphaltic materials covered a total distance of 11,500,000 miles. To better appreciate the extent of this mileage, consider the distance across the United States from New York City to Los Angeles; then multiply that by 3,300.

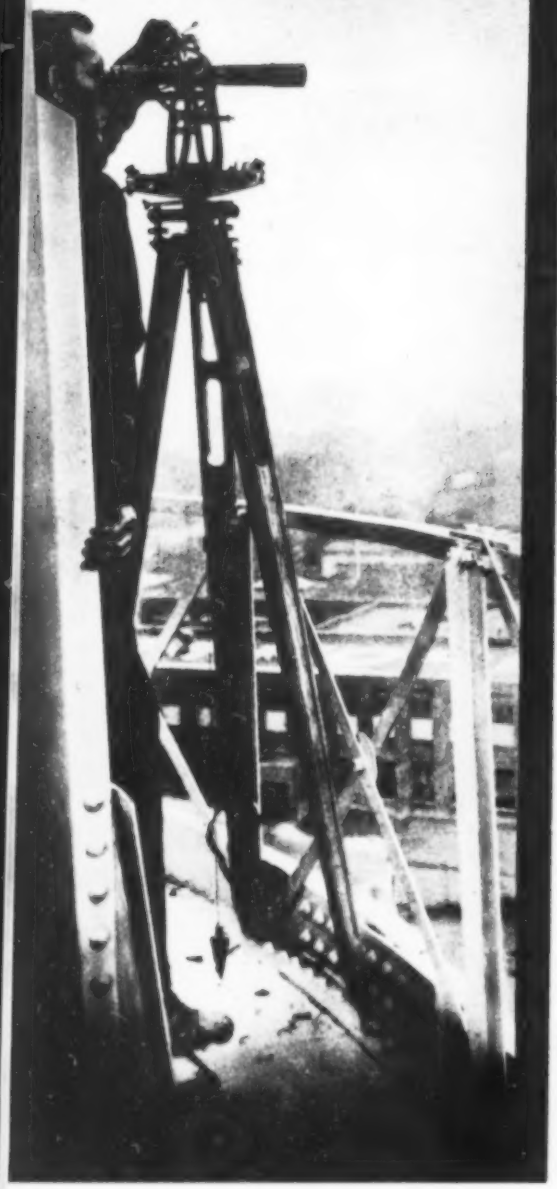
In the course of their extensive travels last year, these tankcars delivered approximately 150,000,000 gallons of TEXACO Asphaltic products for use in America's streets and highways, and in miscellaneous other industries.

TEXACO

ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

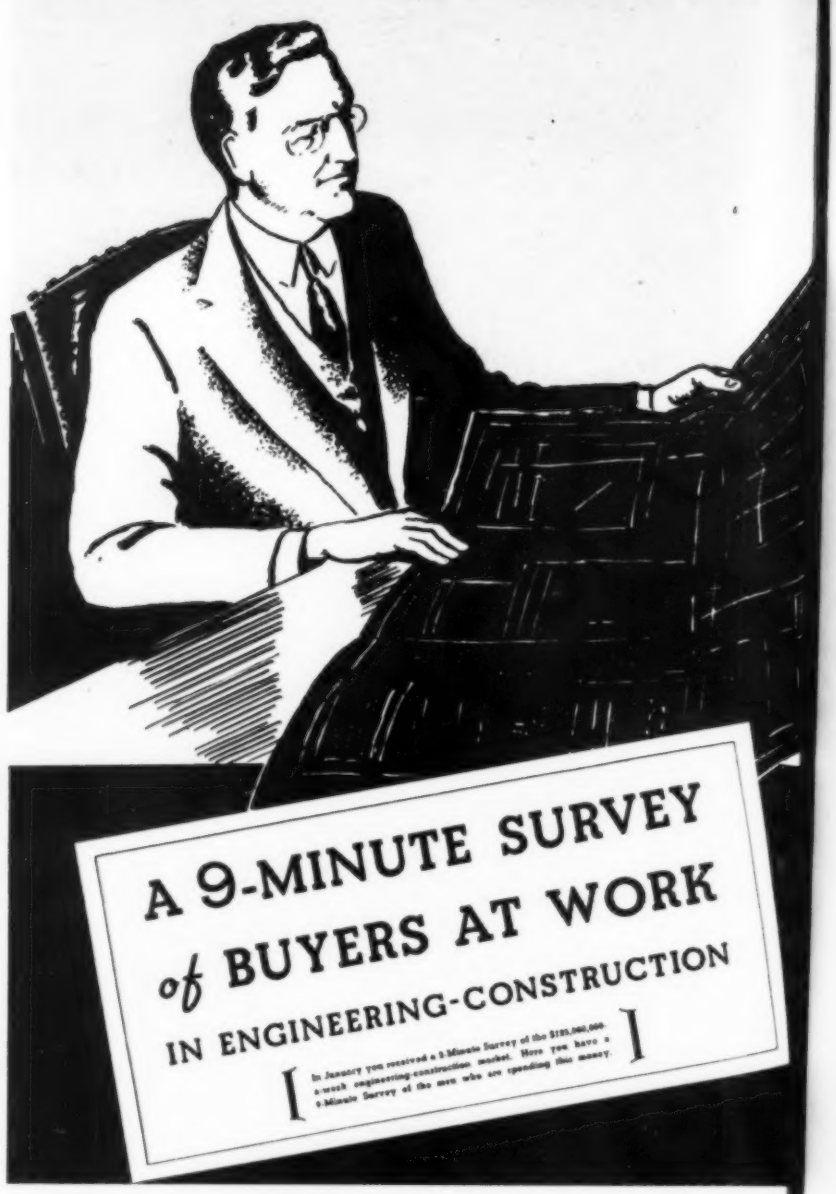
Chicago Cleveland Kansas City Houston Dallas Buffalo Philadelphia Richmond Boston Jacksonville



A 2-MINUTE SURVEY of 1937 PROSPECTS

which mean business for you in the heavy construction industry

BASED ON •
• 1936 TRENDS



EXACTLY 11 MINUTES

To Appraise This 6½ Billion-Dollar Market and Its Buyers

YOURS FOR THE ASKING

2 MINUTES

● This brochure is a graphic presentation of the engineering-construction industry. In picture and chart it breaks the market into its main divisions and shows where each division is heading in 1937. Commenting on the presentation, **Advertising & Selling** says it's a funny thing but the truth that it takes only two minutes to get a grasp of this 6½ billion-dollar business. Several manufacturers have had the study sent to their salesmen and distributors.

9 MINUTES

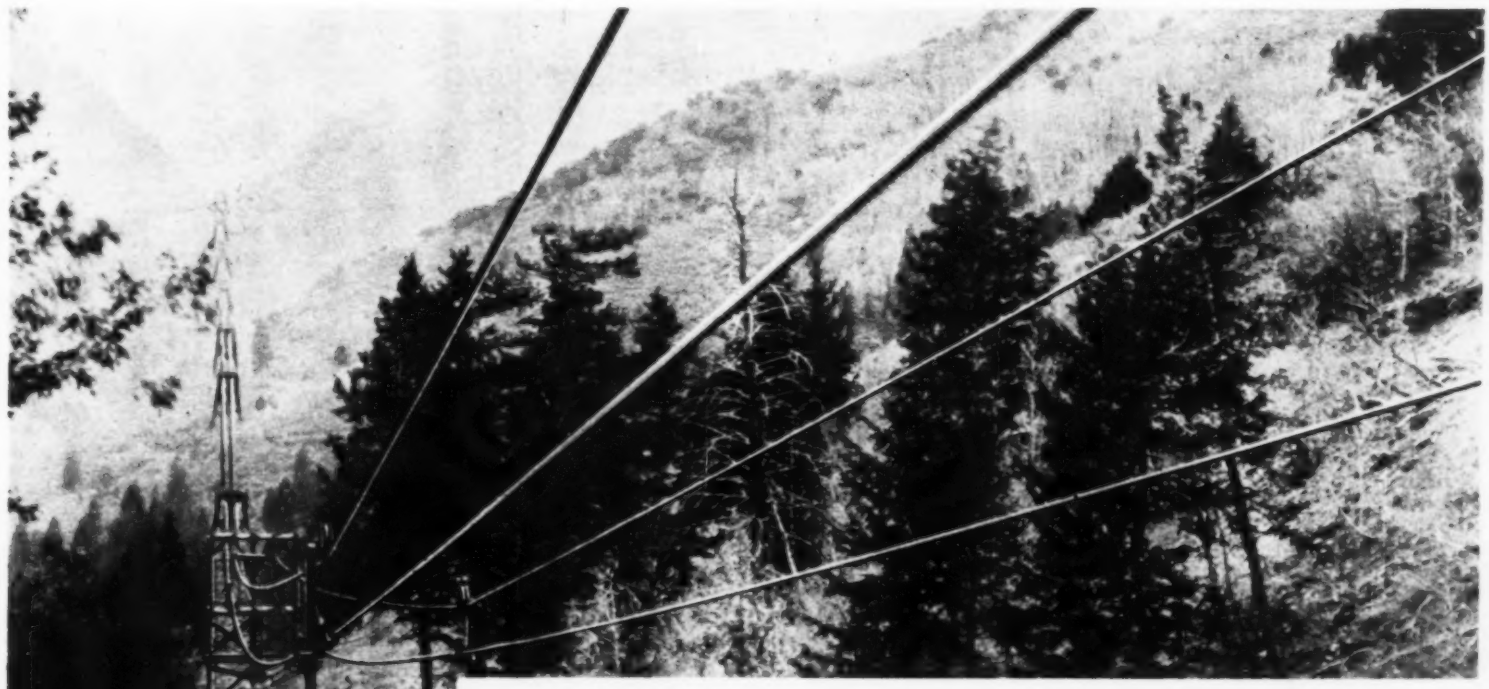
● Hot off the press, this follow-up brochure identifies the men who are participating in the spending of the 6½ billions. Examples of buying habits and actual purchases are given. It enables one to trace the sale of an item down through all the various factors involved. The proofreader claims it takes only 8 minutes to read it but allowance is made for the fact that he is a professional reader.

Either or both brochures will be sent upon request, with the compliments of CONSTRUCTION Methods and Equipment, McGraw-Hill Publishing Company, Inc., 330 W. 42nd St., New York, N. Y.

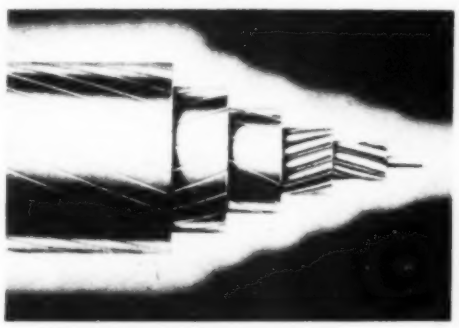
THE ROAD IS NEVER TOO ROUGH

. . too Steep . . too Wet

WITH A U·S·S AERIAL WIRE ROPE TRAMWAY



Smooth surface, strength, toughness, sufficient flexibility and the Locked Coil Construction produce this ideal Tramway Track Cable.



DIFFICULTIES resulting from rugged terrain and adverse weather conditions are easily overcome by using Aerial Wire Rope Tramways for your material-handling.

Hauling by aerial tramway is independent of ground conditions. Highways, canals, rivers, railroads, mountains, and valleys can be crossed with savings in distance, time, money and effort. Snow, ice, rain or mud present no transportation difficulties to Aerial Tramways. Once the system is installed, handling is smooth, fast, and efficient. Right-of-way is usually easy to obtain, as widely-spaced towers hold all operations well above the level of all normal ground movements.

In general, it is found that aerial tramway operation costs between 1¢ and 6¢ per ton-mile, including power, operating labor, maintenance materials and labor, lubrication and depreciation. The figures vary due to the many factors involved, but you can be sure that this system can reduce handling costs where conditions make ground movement slow or difficult.

Our experienced engineering staff will gladly help you solve your material-handling problems and make definite recommendations. Send for our free Aerial Tramway Handbook. This interesting book contains many helpful suggestions for uses and operation of this economical system of haulage.

U·S·S AERIAL WIRE ROPE TRAMWAYS

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago · Empire State Building, New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Expert Distributors*

UNITED STATES STEEL

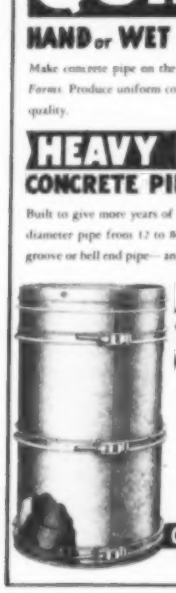
QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with *Quinn Pipe Forms*. Produce uniform concrete pipe of highest quality.

HEAVY DUTY CONCRETE PIPE FORMS

Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe—any length.



NEW MEDIUM DUTY CONCRETE PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. Same sizes as "Heavy Duty," from 12 to 84 inches—any length.

WRITE TODAY

For prices and features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS

1625 TWELFTH ST. BOONE, IOWA

SpeedWay Electric **SAWS**

Cuts Straight or at Angles

More Tool for the Money

Wood, tile, marble, cement, reinforced concrete — most anything

THE *SPEEDWAY* 185 HANDLES THE JOB whatever it is — 4,600 r.p.m., 1 1/5 h.p. All ball bearing with guaranteed spiral and bevel gears, accurate bevel adjustment and ripping guide. Weighs only 25 lbs. Oil twice a year. The sturdiest general-purpose saw built. 5 other types.

SpeedWay Manufacturing Co.

1862 So. 52nd Ave. Cicero, Ill.

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WELLPOINT SYSTEMS

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Distributors In

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Principal Cities

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GRIFFIN WELLPOINT CORP.

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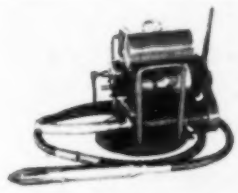

Concrete VIBRATORS and Grinders

Write for Circular on types, sizes and prices

White Mfg. Co.

ELKHART INDIANA

COMPLETE

WELL POINT SYSTEMS

WILL DRY UP ANY EXCAVATION

Faster—More Economically

Write For Job Estimate and 32 page Catalog

COMPLETE

MACHINERY & EQUIPMENT CO., Inc.

36-36 11th St., Long Island City, N. Y.

Tel. IRonsides 6-8600

STRAIGHT EDGES

Either Steel or Aluminum for Concrete Road Construction

Two usable edges: — one sharp cornered and squared for scraping. The other rounded for line point checking.

OTHER GIANT GRIPT PRODUCTS

Edgers — Hand Floats — Bull Floats — Concrete Brooms

L. and M. MANUFACTURING COMPANY

Div. of Mondie Forge Co., Inc.

10300 Berea Road, Cleveland, Ohio

HOISTS

STEAM — ELECTRIC — GASOLINE

WRITE FOR BULLETINS —

Stroudsburg Engine Wks., Stroudsburg, Pa.

New Advertisements

must be received by the 18th of the month to appear in the issue out the following month.

Address copy to the Departmental Advertising Staff
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330 West 42d St., New York City

JACKSON CONCRETE VIBRATORS
FOR EVERY PLACING PROBLEM

Write for Information

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON — MICHIGAN

"ACME" ROAD MACHINERY

Heavy Duty—Larger Capacity—Longer Life—

Try a new Acme Reduction Crusher or a new Acme H. D. Roller Screen on your new job.

Guaranteed rebuilt or used equipment available on attractive lease or sales contract.

For Satisfaction and Service use Genuine **"ACME"** Parts. Communicate with nearest Dealer, main office—*Frankfort, N. Y. or 120 Liberty St., New York City.*

On this page

Other men who see this section, *as you are doing*, are *also* interested in anything that has a part in efficient and economical construction operations. How logical, then, to convey information of appropriate construction equipment, material and supplies to these men through advertising right here on this page. Address the

Departmental Advertising Staff

CONSTRUCTION Methods and Equipment

330 West 42nd St. New York City

SEARCHLIGHT SECTION

FOR SALE

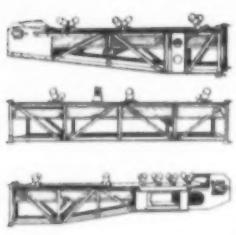
10-TON TRUCK TRAILER

Hard Rubber Tires — No Brakes — $725.00.

B. E. LINDSTROM

9 S. Clinton St. Chicago, Illinois

NEW WAYS TO CUT MATERIALS HANDLING COSTS



The flexibility and adaptability of the Porta Model "347" Sectional Conveyor offers wide opportunities for cutting costs and increasing profit in the handling of crushed stone, aggregates, sand, gravel and concrete.

Made up of independent sections—can be mounted on caster truck, wheel truck or on supports as a semi permanent or permanent installation.

Readily dis-assembled and stored—easily transported—easily re-assembled.

User may start with several sections and add additional sections, mountings or accessories as desired.

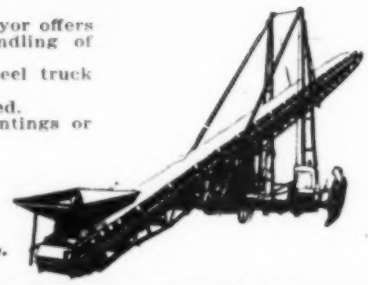
Write for Bulletin "347"

Write, Phone or Wire Nearest Office

PORTABLE MACHINERY COMPANY

Division of A. B. FARQUHAR CO., Limited

Lakeview Avenue CLIFTON, N. J. | Box C-11 YORK, PA. | 2549 N. Keeler Ave. CHICAGO, ILL.



Judge Them By Their Work

You are asked to judge Baker Bulldozers and Gradebuilders by their performance, not only by our claims. The number of Baker users has reached a high peak because they have everything a contractor wants and more. Larger capacity —greater strength—more accurate control—fewer repairs—tremendous down-pressure, these are a few of the many features of these simply constructed machines. If you want Bulldozers built for real work and not for quick sales, select Bakers.

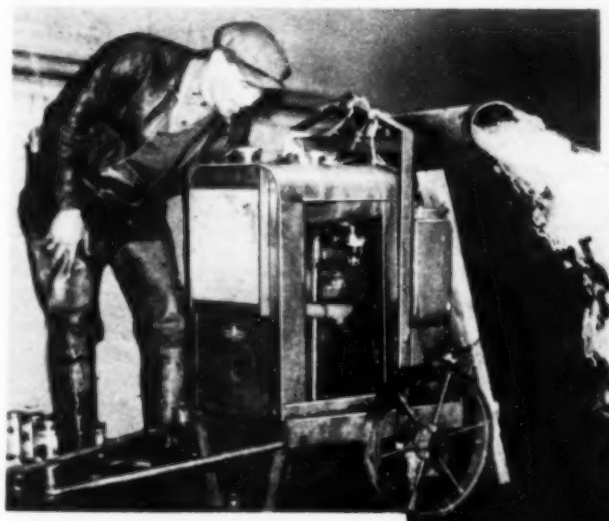
Send for 32-page Bulldozer Bulletin.

Ask also about Baker Rooters, Road Discs, and Tractor Scrapers.

The Baker Mfg. Co., 568 Stanford Ave., Springfield, Ill.

BAKER
BULLDOZERS
GRADEBUILDERS
DIRECT LIFT
HYDRAULIC

FLOOD Water



Handled by Hundreds of NOVO PUMPS

Rushed to the flood area—hundreds of Novo Pumps rendered faithful service in that gigantic test of men and machines. Pumping constantly, day and night, right through the disaster, and the clean up period—the pumps that stood the test.

DID YOU KNOW?

That Novo Self Priming Centrifugal Pumps now have:
GREATER HORSEPOWER than ever before?
NEW COMPACT ACCESSIBLE design?
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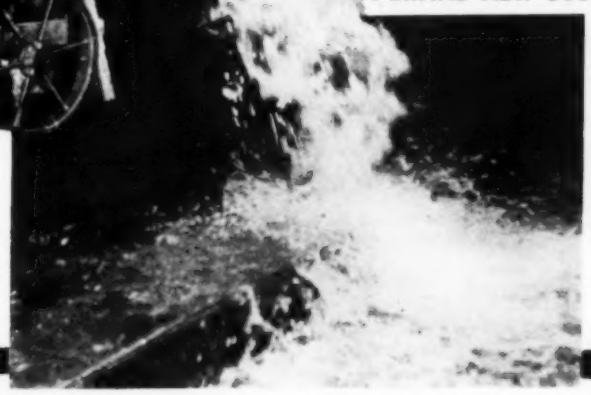

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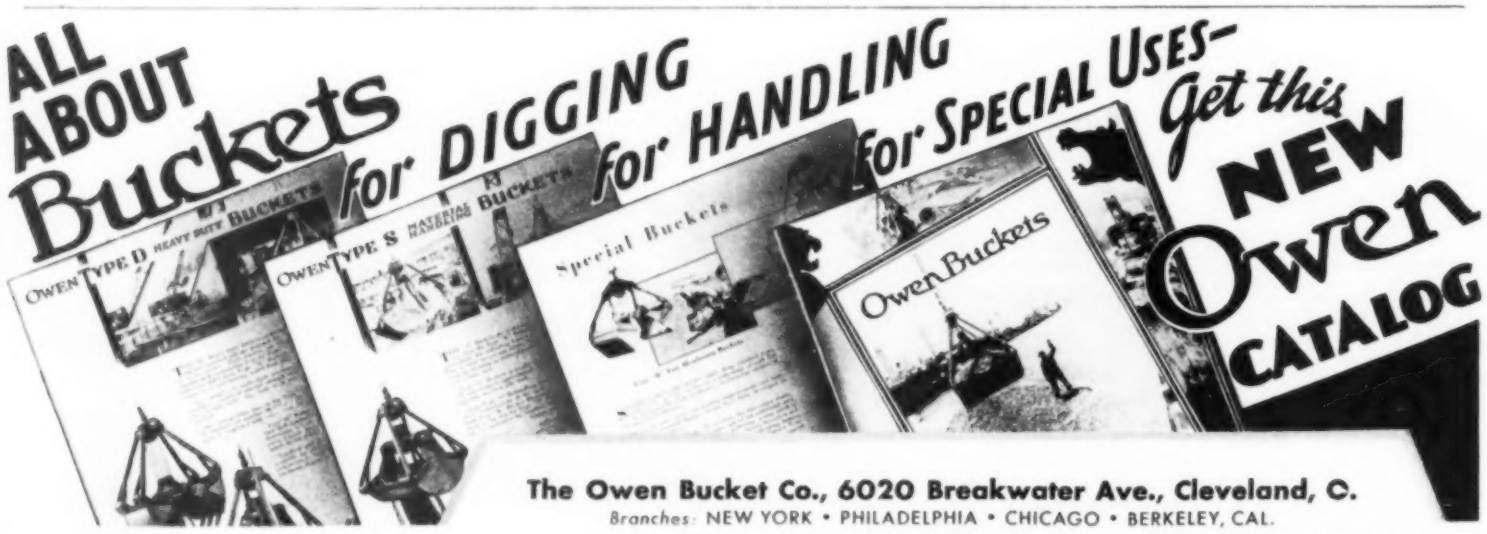
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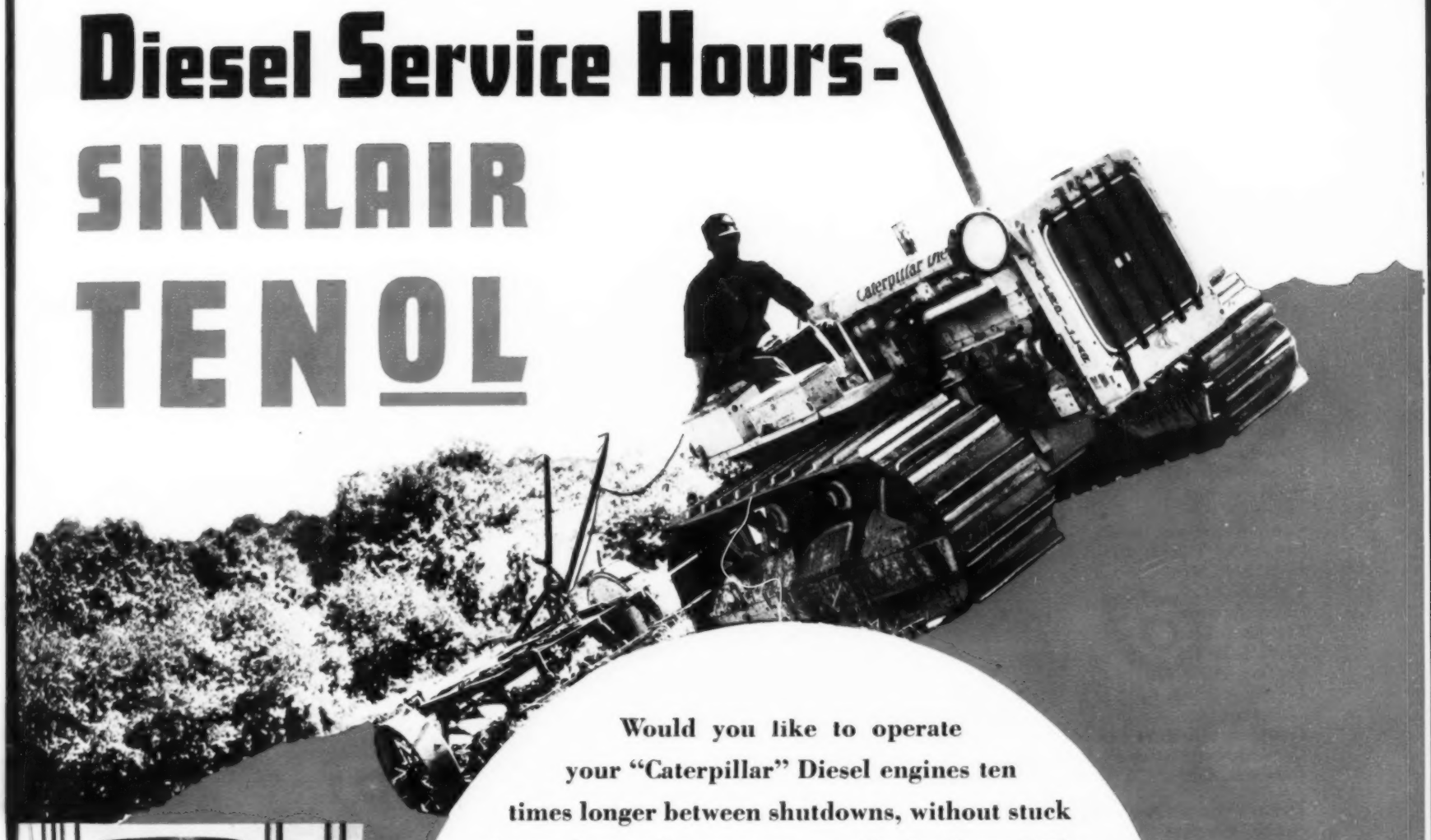

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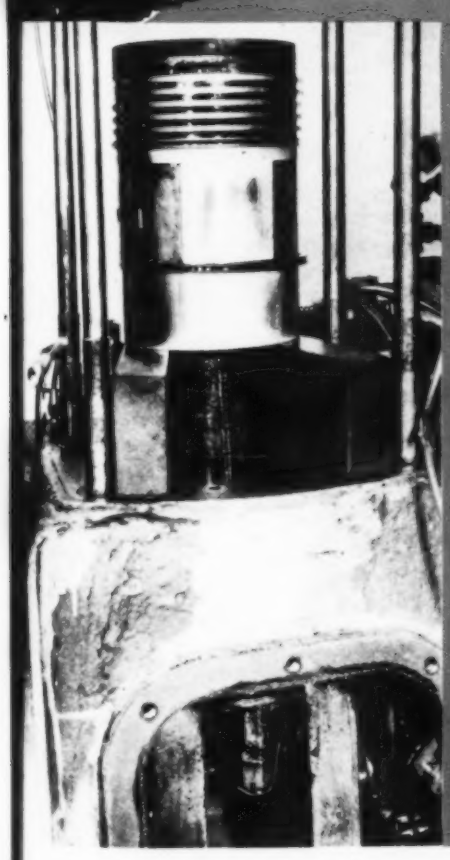

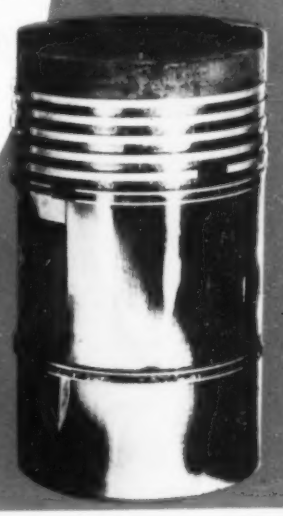

Sinclair Ten-ol lubricated this official "Caterpillar" Diesel test engine in a continuous 1093-hour accelerated wear test at the Sinclair Bureau of Standards. The above unretouched photograph shows engine taken down for inspection. Note perfect condition of rings and piston, and the cleanliness of the crankcase after draining. Compare with piston at right.

The finest grade of straight mineral oil was used to lubricate the above piston in a "Caterpillar" Diesel engine during a continuous acceleration test only 1/10 as long as the test described at left. Note in unretouched photo signs of blow-by indicating poor piston seal, carbon-coated piston crown, sludge, plugged oil control rings and gum on piston skirt.

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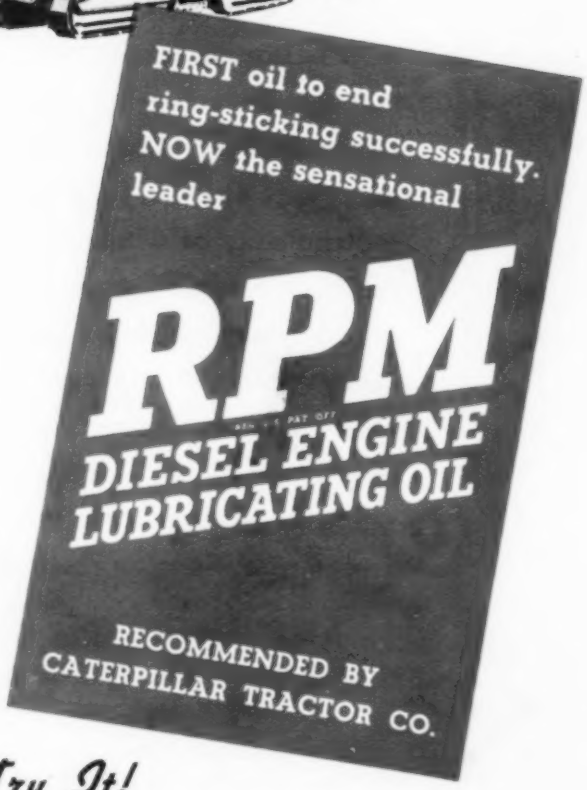
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